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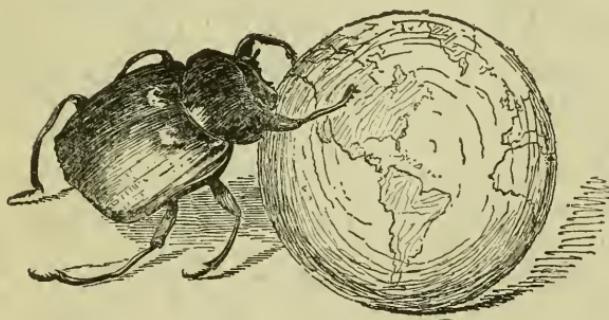
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Publication Committee.

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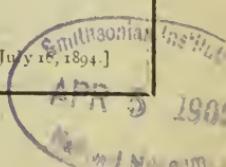
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JOURNAL
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VOL. XVII.

MARCH, 1909.

No. 1.

NEW GENERA AND SPECIES OF TROPICAL
MYRMELEONIDÆ.

BY NATHAN BANKS,

EAST FALLS CHURCH, VA.

Dimares pretiosa, new species.

Head blackish, lower margin of labrum yellow; vertex mostly pale, with three dark spots each side; palpi black; antennæ black; pronotum pale, with a large blackish spot on posterior part with three extensions forward to front margin; thorax dull black, a pair of submedian pale spots on meso- and metanotum, and the hind border of meso- and metascutellum pale; legs pale, femur faintly striped above near tip, and tips of tarsal joints darker; abdomen brown to black, unmarked. Wings hyaline, with many large brown spots; fore wings with some small basal spots, an oblique band of larger spots before middle, one beyond middle and before stigma of three large spots, one at stigma, ending in two smaller spots on the hind border; the costal spot of this last band connects to the three connected apical spots. Hind wings with two or three small spots along radius in basal part; a large spot in disk before middle; an oblique band of three spots at middle, another band beyond middle ending in two spots on the hind margin; the costal spot of this last band connects to the apical trifid spot, which, like that of the fore wing, leaves two hyaline spots, one before and one behind the tip of wing. Expanse 64 mm.

Mollendo, Peru, Dec.

The described species of *Dimares* may be separated by the following table:

- | | |
|---|--------------------------|
| 1. No spots on the wings; thorax pale in the middle, with a narrow median black stripe..... | <i>albidilinea</i> Walk. |
| Spots on the wings..... | 2. |
| 2. Thorax pale in middle, with a narrow median black stripe; spots of wings nearly all separated and none forming bands across wings..... | <i>elegans</i> Perty. |
| Thorax mostly dark above; spots forming more or less distinct bands, at least in the hind wings..... | 3. |

3. Hind wings with a small median spot at or before the middle.....4.
No such spot in hind wings; a complete preapical band forked behind; no spots on basal part of hind margin of hind wings.....*venustus* Bks.
4. Hind wings with three bands, partly connected together, the apical with two pale spots, fore wings with complete bands.....5.
Hind wings without complete bands, all more or less broken, not connected.....6.
5. Hind wings with dark spots along hind margin before the middle; fore wings with apical third brown, and two bands*subdolus* Walk.
Hind wings without spots along hind margin before middle, fore wings with three bands.....*formosus* Bks.
6. Spots of anterior wings numerous and irregular, not forming bands, but rather along the apical and hind margin.....*bellulus* Bks.
Spots of fore wings form three or four interrupted bands.....*pretiosus* Bks.

Brachynemurus meridionalis, new species.

Head pale, darker around bases of antennæ, a brown band above antennæ, rest of vertex pale; tips of palpi dark, antennæ pale, tip dark; pronotum yellowish, a brown stripe each side; mesonotum brown, a pair of pale spots in front, and some streaks behind; meso- and metascutellum pale, each with a pair of brown stripes; legs pale, tips of tarsal articles darker; abdomen blackish, pale at base. Wings hyaline; fore wings with whitish veins; the costa on basal half, the hind margin, and all the longitudinal veins are marked with small brown clouds at the end of each cross-vein; stigma indistinct; at end of median vein, or rather where it first forks, is a larger dark spot, and in the hind wings a much smaller one. Hind wings with dark veins, except the sub-costa and radius, which are pale and marked with dark spots; the radial sector at base, and the basal part of the cubitus also marked with pale. Three cross-veins before radial sector in fore wings, two in hind wings. Expanse 50 mm.

From Sapucay, Paraguay, 30 Jan.

Brachynemurus strigosus, new species.

Head pale, a dark spot below each antenna, a median black line to labrum, a faint dark dot on each side of labrum; palpi pale; antennæ pale at base, darker toward tip; vertex with a median black line, a transverse black line each side in front, with an extension backward; pronotum brown, above with three pale marks on front margin, and the extreme sides pale, median lobe of mesothorax mostly brown, with three pale spots on each side, and one in middle behind; the lateral lobes mostly pale, each with three blackish spots; mesoscutellum pale, with a black spot each side; lateral lobes of metathorax pale, with a transverse black mark, metascutellum blackish, with a pale median line forked behind, abdomen pale brown, darker on tip; legs pale, tips of tibiæ and of tarsal joints black; spurs as long as first two joints. Wings hyaline; fore wings with pale veins, mostly marked with dark brown in long patches, the cubitus has two or three especially prominent long patches of brown, the marginal veinlets are mostly brown, stigma yellowish, blackish at base. Hind wings with mostly dark veins, no spots; but the sub-costa and radius and part of radial sector are interrupted with pale. Fore wings narrow, sub-falcate at tips, three cross-veins basad of radial sector, the cubitus and median run closer together than in many forms; hind wings more narrow, and more strongly falcate at tips; the fork of cubitus runs parallel to anal for a long distance, two cross-veins basad of radial sec-

tor; in both wings the second and following branches of radial sector are bent so as to appear like one straight vein running toward the tip of wing. Expanse 48 mm.

From Pedregal, Mendoza, Argentina.

Austroleon, new genus.

Fore wings; radial sector arises much before end of anal vein, the anal ends nearly as far out as first fork of radial sector; but three cross-veins basad of radial sector. Hind wings; the anal vein runs about one third the way to tip, bends down suddenly, and not parallel to the very short fork of cubitus, two cross-veins basad of radial sector. Legs not slender, first tarsal joint as long as next two; spurs present, as long as first two joints. In both wings there are few, if any, costals forked before the stigma, and tips of all wings are sub-falcate. Neither of the species are heavily marked.

Austroleon dispar, new species.

Face pale; a small dark mark under each antenna; antennæ pale, second joint marked with black, others with a black band, tips not very dark; vertex with a median pale brown line, a spot in front each side, and some behind, pale brown; palpi pale, last joint with a dark dot; pronotum paler, the lower margin, a stripe each side, a median stripe behind, and two elongate spots in front are black; thorax black, a submedian pair of sharply defined pale stripes, and pale stripes through bases of the wings, the anterior part of the median black stripe is divided by pale; legs pale, femora heavily dotted with black, a few other dots; abdomen dark, with a faint pale stripe each side for one half way out. Wings hyaline; fore wings with the costal and hind margin uniformly black, longitudinal veins pale, interrupted with black, a larger dark spot at end of the median, and at end of the anal vein before it bends to the margin; stigma yellowish. Hind wings with mostly dark veins; the radius, sector, and cubitus interrupted with pale; stigma yellowish, the apical part of all marginal veinlets dark. Hind wings much narrower than fore wings; both falcate at tips; cells between branches of radial sectors elongate. Expanse 50 to 58 mm.

From Pedregal, Mendoza, Argentina.

Austroleon compar, new species.

Face pale; palpi pale; a pale brown mark under each antenna, and a pale band above; vertex with a transverse dark spot each side; antennæ pale, black toward tips; pronotum pale, a broad black stripe each side to lower margin, leaving a very broad pale middle area; thorax pale, a blackish stripe each side above the wings, scutellum with a faint median dark line; legs pale, femora darker each side toward tip, and tips of tarsal joints dark; abdomen pale, blackish beyond the middle, the tips of some of the pale segments black above. Wings hyaline; fore wings with veins interruptedly brown, the brown never extending out on the membrane; a dark spot near tip of the median vein; stigma pale, dark at base. Hind wings similar, with dark spots less distinct: the cells between the branches of the radial sector are all large, none compressed; hind wings not so much narrower than fore wings. Expanse 32-38 mm.

From Pedregal, Mendoza, Argentina.

Macroleon, new genus.

Fore wings; anal vein ends before first fork of radial sector; 12 to 15 cross-veins before radial sector, many of them crossed; cubital forks very divergent, and much before end of anal, radial sector with numerous branches. Hind wings; the anal vein runs into the fork of cubitus, and not into margin; 5 or 6 cross-veins before radial sector. Wings long, broad near tip, but pointed; costal series single. Spurs not as long as first tarsal joint; antennæ long. Type *Myrmeleon validus* McLachl.

Nesoleon, new genus.

Fore wings; the anal vein ends before the fork of radial sector; about 9 cross-veins before radial sector; the fork of cubitus runs parallel to anal for some distance,

Hind wings; about 8 cross-veins before radial sector; the fork of cubitus runs parallel to anal for some distance. In both pairs the wings are short and broad, and broadly rounded at tips. Spurs not as long as first tarsal joint, and very slender and weak.

Nesoleon braunsi, new species.

Face black in middle, a large yellowish spot each side, clypeus pale; palpi black at tip; antennæ black; vertex black; two transverse pale lines each side, connected near middle; pronotum pale, with three broad black stripes, the lateral ones containing a pale streak, the median one enlarged near middle; thorax with middle area pale, with a median black stripe through the scutelli; the anterior lobe of mesothorax black, with a pale spot each side behind; lateral lobes with some pale spots over bases of wings; abdomen black. Legs pale; femora blackish above; tibiae with two black bands; and tips of tarsal joints black. Wings pale, or rather blackish, since this latter color occupies the greater part of the surface, especially in the male; in the latter the fore wings are black from tip to one third near base, where the black is broken up into small spots; the stigma is white, two white spots under radius near middle, and some small white spots along the median vein. Hind wings of male still more evenly black, the basal third pale, and stigma white. In the female the hind wings are nearly as in the male, but the pale extends farther out from base and there is a pale spot under radius near middle; the fore wings have the brown or blackish much broken up; three larger pale spots; one near middle under radius, one at the stigma, and a third in the disc behind these; the apical part of wing has as much pale as dark; the hairs borne by the veins are snow-white. Spurs short and weak, very slender. Wings broad, rounded at tips; in fore wings the anal ends before first fork of radial sector; 9 veins before radial sector; the fork of cubitus runs parallel to the anal for a long distance, also in the hind wings, and here there are 8 cross-veins before radial sector. Antennæ very short; abdomen of male, as well as of female, shorter than wings. Expanse 38 to 43 mm.

From Willowmore, Cape Colony, Dec. (Dr. Brauns).

SOME NEW PHORIDÆ FROM THE PHILIPPINES.

BY CHARLES T. BRUES,
MILWAUKEE, WIS.

The following two species of Phoridæ, both belonging to the genus *Aphiochæta*, were recently sent to me by Mr. Ernest E. Austen, of the British Museum. Both prove to be new to science, and I have his kind permission to publish descriptions of them. The types are in the British Museum, and cotypes in the collections of the Public Museum of the city of Milwaukee. These are the first species to be published from the Philippines, although many others doubtless occur there, among them quite probably some of those recently described from New Guinea and the neighboring islands. The present ones were collected by C. S. Banks, of the Bureau of Science in Manila.

Aphiochæta banksi, new species.

Male and female. Length 2.5–4.5 mm. Pale testaceous, the head more or less infuscated above, abdomen marked with piceous. Front as wide as long, with an ocellar tubercle and median frontal groove. Four proclinate setæ, all well separated, and the lower pair strong, well developed. Bases of first row of reclinate setæ forming a downwardly bowed line with the upper proclinate pair, all of these six being at about an equal distance from the lower margin of the front and equidistant from each other. Second row of reclinate setæ forming a slightly curved line well above the middle of the front, the lateral ones very close to the eye-margin. Ocellar row as usual. Cheeks each with two stout, downwardly directed macrochaetae and a row of small bristles close to the eye-margin. Postocular cilia strong, slightly enlarged below. Antennæ almost spherical with dorsal, nearly bare arista. Palpi comparatively large, without stout bristles. Proboscis stout and prominent, although short, of chitinous structure. Thorax rather elongate, finely hairy. One pair of dorsocentral macrochaetae and four strong marginal scutellar bristles, the lateral pair being nearly as stout as the median one. Margin of mesonotum between the base of the wing and the scutellum on each side with two very strong macrochaetae. Abdomen testaceous or pale yellow, marked with piceous as follows: a delicate posterior margin on the first segment; a broad one on the second, which is widened laterally; third and fourth segments entirely black, except for a median elliptical space which touches the anterior margin, but is separated from the posterior one by a narrow band of black; fifth with a dark spot at the sides; hypopygium of male also dark. In the female the dark markings tend to weaken or to become smaller. Venter pale. Legs long and stout (Fig. 1), the posterior femora

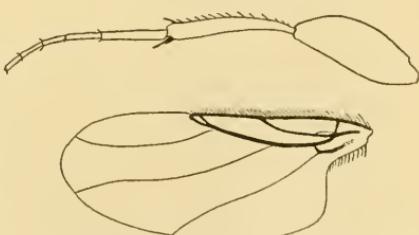


FIG. 1.—*Aphiochæta banksi*, n. sp. Hind leg and wing of female.

quite noticeably thickened; anterior and middle tibiæ very weakly ciliate; posterior ones with about 12 unusually strong setulæ. Legs pale, the tips of the hind femora infuscated. Wings (Fig. 1) hyaline, with yellowish veins; costal vein reaching fully to the middle of the wing or slightly beyond, with closely-set, short, fine cilia; auxiliary vein very indistinct; first vein ending a little nearer the tip of the third than the humeral cross-vein; third vein acutely forked, but very near to the tip so that the cell thus formed is small; fourth vein but little curved; fifth weakly bent towards the middle; sixth slightly bisinuate; seventh faint. Halteres pale.

Numerous specimens of both sexes from Manila, Philippine Islands, "found breeding in culture media in Bureau of Science." They were collected by Dr. C. S. Banks.

Aphiochæta curtineura, new species.

Length 2.5-4 mm. Brownish testaceous, more or less of the front and abdomen above infuscated. Head comparatively flat antero-posteriorly. Front about as wide as high, with ocellar tubercle and median frontal groove; brownish or quite dark, its bristles stout. Four proclinate setæ, all of them very stout; the lower pair as strong as the upper. Lower lateral angles each with a pair, the median one of which is distinctly lower than the upper proclinate seta. Middle frontal row nearly straight, slightly bowed downward. Ocellar row as usual. Cheeks each with two stout macrochætae at the lower angle, above which are a series of very small ones anteriorly. Postocular cilia stout. Antennæ nearly spherical, with a short, very slightly pubescent arista. Palpi small, but with very stout macrochætae. Proboscis short and fleshy. Thorax thinly hairy, testaceous, with one pair of dorsocentral macrochætae and only one pair of strong scutellar bristles. Mesopleural bristles five, of moderate size. Abdomen testaceous, with distinct brownish bands which are nearly contiguous in fully colored specimens. Sides dark above and apically, venter very pale. Legs testaceous, stout, the hind femora considerably swollen and weakly ciliate near the tip below; darkened at the apex. Hind tibiæ strongly setulose, the setule about 12 in number, about two thirds as long as the diameter of the tibia at their insertions. Wings (Fig. 2) hyaline, elongate, the veins pale brown; costal veins scarcely over one third the length of the wing, its cilia rather short and closely placed; first, second and third veins entering the costa very close together, the cell at the furcation of the third extremely small, though always distinct; third vein at the tip somewhat swollen; fourth vein very faintly curved, ending as near the wing tip as the fifth, which is also nearly straight; sixth very weakly sinuate; seventh fine but distinct. Halteres pale.



FIG. 2.—*Aphiochæta curtineura*, n. sp. Wing.

Described from several specimens of both sexes included in the same vial with the preceding species, from which it differs by its very short costal vein, different chætotaxy of front and scutellum.

THE SAWFLY GENUS CRYPTOCAMPUS IN BOREAL NORTH AMERICA.

By S. A. ROHWER,

BOULDER, COLO.

This paper is the result of my studies on the Nematid genus *Cryptocampus* (= *Enura*). The species of this genus resemble each other in the color very much. For example, the males of *bebbianæ*, *macgillivrayi*, *salicis-ovum*, *salicis-nodus* and *propinquus* cannot be separated by any reliable color character, yet they are all very distinct. This being the case, the old descriptions, which deal almost entirely with color, are of very little value. I have found the shape of the sheath and the sculpturing of the head to be constant within each species, and very valuable in separating the various species. The following is an explanation of the terms used in this paper. Many of them are used in Mr. C. I. Marlatt's most valuable work on the Nematinae of North America [Tech. Ser. 3, U. S. Dept. Ag., 1896].

Middle fovea = the fovea between the bases of the antennæ.
Middle carina = the carina between the bases of the antennæ, below the middle fovea. This is sometimes wanting and is of little value in this genus.

Antennal foveæ = the foveæ around the bases of the antennæ.

Frontal crest = the part of the front between the bases of the antennæ, above the middle fovea. This is best seen from above.

Ocellar basin = the basin around the lower ocellus.

Intercellar furrow = the transverse furrow behind the lateral ocelli.

Lateral ocellar furrow = the longitudinal furrows which usually extend from the occiput to the antennal foveæ.

The larvæ of all the known American species make galls upon the twigs of some species of willow. It seems highly probable that each species is restricted to a certain species of *Salix*. I have found in the mouth of Boulder Cañon, Colo., bushes of *Salix luteosericea* and *Salix bebbiana* growing so closely together that the twigs were intermingled, but in no case did I find *C. macgillivrayi* in galls on *Salix bebbiana*, or *C. bebbiana* in galls on *Salix luteosericea*.

It is at present impossible, unless the adults are reared, to determine with accuracy the galls of any species, with the exception of

the few which have been reared from willows which were specifically determined. The galls of *C. cooperæ* Ckll. and *C. brachycarpæ* Roh. look alike, but occur on different species of *Salix*.

Cryptocampus Hartig.

Cryptocampus Hartig, Aderfl., p. 221 (1837).

Enura Newman, Ent. Mag., Vol. 4, p. 259 (1837).

Head small, seen from the front usually rectangular. Pentagonal area variable. Antennæ 9-jointed, slender, usually distinctly tapering; longer in the ♂ than in the ♀. Fore wings with three cubital cells, the second transverse cubitus wanting; stigma large; lanceolate cell petiolate. Hind wings with two discal cells which are normally equal on the outer margin; lanceolate cell of hind wings with a long petiole. Claws cleft, or with a large subapical tooth. Sheath variable. Cerci (♀) very long, slender. Procidentia (♂) variable but as a rule not very large. Hypopygium (♂) large, extending beyond the procidentia.

TABLE OF THE ADULTS.

(*C. albirictus* and *C. orbitalis* v. *niger* have been omitted.)

Females.....	I.
Males	13.
1. Almost entirely bright reddish-yellow (basal half of stigma pale; ocellar basin well defined).....	<i>macgillivrayi</i> Roh.
Black, or at least the thorax almost entirely black.....	2.
2. Clypeus entirely black.....	3.
Clypeus with at least the apical margin pale.....	7.
3. Legs below the coxae bright reddish-yellow (upper margin of the sheath tapering; middle fovea circular, small, rather indistinct).....	<i>perditus</i> Roh.
Legs below the coxae and at least the femora at the base brownish.....	4.
4. Ridges around the ocellar basin wanting (the basin is indicated by a shallow depression); tegulae sometimes pale.....	5.
Ridges around the ocellar basin present, but rounded; tegulae black	6.
5. Lateral ocellar furrow deep, distinct; antennæ black; sheath slightly emarginate above.....	<i>niger</i> Prov.
Lateral ocellar furrows almost wanting; antennæ more or less pale beneath; sheath straight above	<i>salicicola</i> E. A. Sm.
6. Sheath distinctly emarginate above; labrum and mandibles entirely black.	
	<i>maurus</i> Roh.
Sheath straight above; labrum and mandibles testaceous	<i>insularis</i> Kincaid.
7. Walls of the ocellar basin well defined, although not always strongly so.....	8.
Walls of the ocellar basin obsolete.....	12.
8. Frontal crest unbroken (inner orbits broadly pale; venation light brown; legs entirely bright rufo-ferruginous).....	<i>orbitalis</i> Nort.
Frontal crest distinctly broken.....	9.
9. Abdomen above entirely black; inner orbits black and usually the posterior ones; frontal crest trilobate.....	<i>brachycarpæ</i> Roh.
Abdomen at the apex above pale; inner and outer orbits pale.....	10.

10. Stigma, except extreme base, black (venation usually normal; apical antennal joint slightly shorter than the preceding one) *bebbianæ* Roh.
 Stigma, except apex, pale..... II.
11. Apical antennal joint gradually tapering; ocellar basin strongly defined; lower discal cell of hind wings shorter than upper..... *cooperæ* Ckll.
 Apical antennal joint obliquely truncate; ocellar basin not so strongly defined; lower discal cell of hind wings longer than upper..... *salicis-ovum* Walsh.
12. Length 3.5 mm.; clypeus slightly emarginate..... *parvus* Roh.
 Length over 4 mm.; clypeus rather deeply emarginate..... *salicis-nodus* Walsh.
13. Clypeus entirely black..... 14.
 Clypeus with at least the apical margin pale..... 15.
14. All the femora black..... *maurus* Roh.
 Some of the femora pale..... *salicicola* E. A. Sm.
15. Legs below the coxae marked with brown..... 16.
 Legs below the coxae entirely reddish-yellow (apex of hind tibiæ sometimes brownish)..... 17.
16. Stigma tapering to an acute point; clypeus narrowly notched, *insularis* Kincaid.
 Stigma not tapering to an acute point; clypeus not deeply or narrowly notched..... *brachycarpæ* Roh.
17. Stigma entirely dark brown..... 18.
 Stigma pale at the base..... 19.
18. Lateral ocellar furrows distinct, deep; antennal foveæ large..... *propinquus* Roh.
 Lateral ocellar furrows not deep or distinct; antennal foveæ not so large..... *bebbianaæ* Roh.
19. Flagellum black (orbita black)..... *perditus* Roh.
 Flagellum pale beneath..... 20.
20. Sides of abdomen above more or less pale..... *salicis-ovum* Walsh.
 Sides of the abdomen above black..... 21.
21. Flagellum entirely pale beneath..... *salicis-nodus* Walsh.
 Flagellum black basally..... 22.
22. Frontal crest notched..... *macgillivrayi* Roh.
 Frontal crest unbroken..... *orbitalis* Nort. ♀.

TABLE OF GALLS.

- An enlargement of the twig..... 1.
 A lateral swelling on the twig..... 3.
1. Enlargement abrupt at the lower end..... *propinquus* Roh.
 Enlargement not abrupt at the lower end..... 2.
2. On *Salix longifolia*..... *salicis-nodus* Walsh.
 On *Salix luteosericea* *macgillivrayi* Roh.
3. Swelling elongate..... 4.
 Swelling ovate or round..... 5.
4. On *Salix humilis* *orbitalis* Nort.
 On *Salix bebbiana* *bebbianaæ* Roh.
 On *Salix* sp. (bark [dry] reddish) *propinquus* Roh.?
5. Swelling gradual..... 6.
 Swelling abrupt..... 7.

6. On *Salix cordata*.....*salicis-ovum* Walsh.
 On *Salix humilis*.....*salicis-ovulum* Walsh.
 7. On *Salix brachycarpa*.....*brachycarpe* Roh.?
 On *Salix* sp.....*cooperæ* Ckll.

The galls of *parvus* Roh., *insularis* Kincaid, *niger* Prov., *albirictus* Cress., *orbitalis* var. *niger* Nort., *perditus* Roh., and *maurus* Roh., are not known. I have not seen nor have I a description of the gall of *salicicola* E. A. Sm. It occurs on *Salix alba*.

1. *Cryptocampus orbitalis* (Norton).

Enura orbitalis Norton, Proc. Ent. Soc. Phil., i, 1862, p. 144; Tr. Am. Ent. Soc., i, 1867, p. 79.

Enura salicis-gemma Walsh, Proc. Ent. Soc. Phil., vi, 1866, p. 25.

Enura salicis-gemma Walsh and Riley, Am. Ent., ii, p. 49, 1869.

Enura orbitalis Provancher, Natural Can., x, 1878, p. 51; Faun. Ent. Can. Hym., p. 183, 1883.

Enura orbitalis Thomas, 10th Rept. State Entomologist Ill., p. 69, 1880-1881.

Enura orbitalis Ashmead, Col. Biol. Assoc., p. 40, 1890.

Cryptocampus orbitalis Dalla Torre, Cat. Hym., i, p. 227, 1894.

Enura orbitalis Marlett, Tech. Sr. 3, U. S. Dept. Ag., p. 20, 1896.

Cryptocampus orbitalis Konow, Genera Insectorum, p. 51, 1905.

Female. — Length 5 mm.; length of anterior wing 5 mm. Head seen from the side narrowed toward occiput. Clypeus deeply, circularly emarginate; lobes long and rather sharp. Middle fovea subquadrate, distinct, walls somewhat sloping. Antennal foveæ distinct above the antennæ. Frontal crest prominent, unbroken. Ocellar basin not well defined, but the walls are sharp on the lower margin and about anterior ocellus. Interocellar furrow very faint; lateral ocellar furrows rather broad and shallow, hardly reaching the antennal foveæ. The head around the ocelli is rather closely, finely punctured. Fourth antennal joint a very little shorter than the third; apical joint equal in length with the preceding one. Claws deeply cleft, inner tooth shorter. Venation normal; stigma rounded on the lower margin, obliquely subtruncated at apex. Sheath broad at base, obtusely rounded at apex, the upper margin is not straight. Cerci slightly longer than the sheath above. Black: head except a large spot enclosing ocelli, pronotum, tegulae, abdomen beneath and apical segments above, legs entirely except the bases of the coxae sometimes, cerci ferruginous. The color on the legs and tegulae is sometimes somewhat pallid. Apical joints of the antennæ brownish. Wings clear hyaline, iridescent; venation pale brown, basal part of costa and stigma subpallid.

Male. — I have not seen the male but it is colored like the ♀.

Habitat. — Conn., Ill., N. Y. (Norton); Canada (Prov.); Colorado (Ashm.).

The gall consists of a lateral enlargement of the twig and varies from 4-9 mm. in length, and 3-4 mm. in width. It is monothalamous.

Walsh's species *gemma* has the flagellum red beneath in the ♂, but otherwise agrees in color with *orbitalis*. A comparison of the types of

these two species might prove them distinct. The ♂ variety recorded by Norton (p. 49, Trans. Am. Ent. Soc., i, 1867) is probably a different species. I know of no *Cryptocampus* which is black above and pale beneath, but there are many *Pontaniæ* colored like his variety. It is quite possible that Dr. Ashmead has mistaken *bebbiana* Roh. for *orbitalis* Nort. If such is the case *orbitalis* does not, as far as is known at present, occur in Colorado.

The above description is drawn from two females received from Dr. MacGillivray. They were collected in New York state.

2. *Cryptocampus orbitalis* var. *niger* (Norton).

Enura orbitalis Nort. var. *nigra* Norton, Trans. Am. Ent. Soc., i, 1867, p. 71.

Cryptocampus orbitalis var. *niger* Dalla Torre, Cat. Hym., i, 1894, p. 277.

Cryptocampus orbitalis var. *niger* Konow, Genera Insectorum, p. 51, 1905.

Female.—"A female from Labrador has the whole head, except the mouth, black; the coxae and femora, except at tip, black; the trochanters white" (original description).

Habitat.—Labrador.

This is undoubtedly a distinct species. In the black head it is like *niger* Prov., but has differently colored legs than that species.

3. *Cryptocampus cooperæ* (Cockerell).

Enura salicis-ovum Ckll., The Southwest, Vol. 2, 5, p. 113, 1900.

Enura cooperæ Ckll., Ann. and Mag., Ser. 7, Vol. vii, p. 337, April, 1901.

Female.—Length 5 mm.; length of anterior wing 5 mm. Head similar to *orbitalis* Nort., but not so broad at the occiput. Clypeus deeply, angularly emarginate; lobes broad, obtuse at apex. Middle fovea deep, rather elongated. Antennal foveæ circular, deep, large. Ocellar basin large, broader below, bounded by low, line-like walls. Interocellar furrow wanting; lateral ocellar furrows rather sharply defined, extending to the antennal foveæ. Frontal crest rather prominent, strongly broken in the middle by the middle fovea. Third and fourth antennal joints equal; apical joint slightly longer than the preceding one. Head around the ocelli finely punctured. Claws deeply cleft, the inner tooth much shorter, giving them the appearance of having a large middle tooth. Venation normal, except that the lower discal cell of the hind wing is shorter than the upper; stigma rounded on the lower margin, tapering to the apex. Sheath broad, very obtuse at the apex, straight on upper margin. Cerci about the same length as the sheath above. Black; head, except behind, and a large spot enclosing ocelli (this black spot almost touches the inner eye margins, and does touch the occiput), pronotum, tegulae (the tegulae are slightly pallid), abdomen beneath and the apical dorsal segments, legs entirely, ferruginous. The head and pronotum are slightly brownish. Apical antennal joints ferruginous, but not strongly so. Wings clear hyaline, iridescent, venation pale brown, costa and basal half of stigma white.

Habitat.—Las Vegas, N. M. (Mary Cooper).

The above description is from Professor Cockerell's type. The following is Professor Cockerell's description of the gall of this species : "Gall an oval abrupt lateral swelling on the twigs of *Salix* sp. (a species with very narrow leaves), about 10 mm. long and 7 broad, pale and roughened." The flies emerged April 5 and 9.

In color this species is much like *orbitalis* Nort. and *bebbianæ* Roh. The different emargination of the clypeus, the broken frontal crest and the pale stigma will separate it from *orbitalis*. See remarks under *bebbianæ* to separate it from that species. The gall is much like the supposed gall of *brachycarpæ* Roh., and belongs to the *ovum* group. I have collected galls at the mouth of Boulder Cañon, Colo., which look much like the galls of *cooperæ* and are probably made by this species. They were on *Salix luteosericea* Rydb., a narrow-leaved willow.

I have a dark specimen of *salicis-ovum* Walsh which I received from Dr. MacGillivray, which looks very much like *cooperæ* Ckll., but is not *cooperæ*, may be known from the dark specimens of *salicis-ovum* by the following characters : The ocellar basin more strongly defined, the almost complete absence of the interocellar furrow, while in *salicis-ovum* it is distinct but not strong ; the apical joint of antennæ gradually tapering, not obliquely truncate at the apex as in *salicis-ovum* ; frontal crest strongly broken ; clypeus more angularly emarginate ; lower discal cell of hind wings exceeded by the upper, while in *salicis-ovum* the lower is the longer ; sheath more obtuse at the apex.

The gall of *cooperæ* may be known from the gall of *salicis-ovum* by its more abrupt form, *salicis-ovum* being somewhat sloping.

4. *Cryptocampus salicis-ovum* (Walsh).

Enura salicis-ovum Walsh, Proc. Ent. Soc. Phil., vi, p. 252, 1866.

Enura perturbans Walsh, Proc. Ent. Soc. Phil., vi, p. 254, 1866.

Enura salicis-ovum Nort., Tr. Am. Ent. Soc., i, 1867, p. 50.

Enura perturbans Nort., loc. cit., p. 53.

Enura salicis-ovum Walsh & Riley, Am. Ent., ii, 1869, p. 49.

Enura salicis-ovum Thomas, 10th Rept., State Entomologist Ill., p. 69.

Enura ovum Ashm., Colo., Biol. Assoc., p. 40, 1890.

Enura salicis-ovum Ckll., Tr. Am. Ent. Soc., xx, p. 345, 1893.

Enura ovum Beutenmüller, Bull. Am. Mus. Nat. Hist., iv, Art. xv, p. 267 ; Am. Mus. Jn., iv, No. 4, Oct., 1904, p. 24.

Cryptocampus salicis-ovum Dalla Torre, Cat. Hym., i, p. 278, 1894.

Cryptocampus pertubans Dalla Torre, loc. cit., p. 278.

Enura salicis-ovum Marlatt, Tech. Ser. 3, U. S. Dept. Ag., p. 20, 1896.

Cryptocampus salicis-ovum Konow, Genera Insectorum, p. 51, 1905.

Enura S. ovum Weldon, Can. Ent., Sept., 1907, pp. 299 and 302.

Female.—Length 5 mm.; length of anterior wing 5.5 mm. Head similar to that of *orbitalis* Nort. Clypeus deeply, circularly emarginate; lobes broad, obtuse, middle fovea deep, strong, more sharply defined toward the clypeus. Antennal foveæ not large, or strongly defined. Ocellar basin not very strongly defined. Interocellar furrow broad, but visible; lateral ocellar furrows broad and not quite reaching the antennal foveæ. Third and fourth antennal equal or the third slightly longer; apical antennal joint longer than the preceding, not gradually tapering, but near the apex obliquely truncated. Head closely, finely punctured, subopaque. Thorax above subopaque; the middle furrow of the middle lobe of mesonotum more distinct than usual, claws deeply cleft, inner tooth shorter than the outer, but not as short as the inner tooth of *cooperæ*. Venation of anterior wings normal; lower discal cell of hind wings large and exceeding the upper on the outer margin; stigma rounded on the lower margin, tapering to apex, broadest in the middle. Sheath broad at base, straight on upper margin, obtuse at the apex. Cerci equal to or longer than the upper margin of the sheath. Black: head, except a black spot enclosing antennæ and behind, prothorax, tegulae, legs entirely, abdomen except at base above and sheath, ferruginous. Wings, clear hyaline, iridescent, venation pale brown, costa and stigma pale yellowish, apical part of the stigma dusky.

Habitat.—Ill. (Cresson and Norton, also Walsh), New York, near New York City (Beutenmüller), Colorado (Ashm.).

The above description was drawn from a ♀ received from Dr. Macgillivray. It is much darker than usual, being about the color of the male. The following notes taken from Walsh's original description give the normal color of the female: Shining reddish ferruginous; a spot enclosing ocelli, middle part of mesonotum, base of scutellum, metanotum, basal plates and part of the first dorsal abdominal segment black. Antennæ bright ferruginous beneath, black at the base above, brownish toward apex. I have not seen the male of this species, but a good color description may be found in Norton's catalogue.

The gall is an oval or roundish, sessile, lateral swelling, rising gradually from the twig, not abrupt as in *cooperæ*, etc.; in color "pale opaque brown" (Walsh), with irregular cracks and scales. Length 8-13 mm. Found on *Salix cordata* Muhl. Norton states that certain twigs will be badly infested, having galls every few inches or half inches even, while other twigs will be entirely free.

"Larva pale yellowish, with a pale fuscous head and dark eye spots; removed from the gall it uses its legs freely" (Norton).

Here again I must doubt Dr. Ashmead's record from Colorado. It was probably founded on the gall as was Professor Cockerell's. In working over the collection of the Colorado Agricultural College I found no specimens of *salicis-ovum*, and feel sure that Mr. Weldon did not have the galls of *salicis-ovum*, but rather *cooperæ* or a closely allied

species, as the galls are not those of *salicis-ovum*, but of the *cooperæ* group.

5. **Cryptocampus salicis-ovulum (Walsh).**

Enura salicis-ovulum Walsh, Proc. Ent. Soc. Phil., vi, 1866, p. 253 [original description in which only the gall and larva are described].

Cryptocampus salicis-ovulum Dalla Torre, Cat. Hym., i, 1894, p. 278.

This species was described from the gall and larva. The gall is like *ovum* Walsh, but is found on *Salix humilis*. The larvae differ in color from those of *s.-ovum*.

This may be a distinct species, but it is quite probable that it is merely *s.-ovum*. Till it is bred and the adult compared it will stand as a hindrance to workers. I do not think, however, it should be entirely overlooked, as some workers have been inclined to do.

6. **Cryptocampus albirictus (Cresson).**

Enura albiricta Cresson, Trans. Am. Ent. Soc., viii, p. 4, 1880.

Enura albiricta MacG., Can. Ent., Vol. xxv, No. 10, Oct., 1893, p. 237.

Cryptocampus albirictus Dalla Torre, Cat. Hym., Vol. i, 1894, p. 274.

Enura albiricta Marl., Tech. Ser. 3, U. S. Dept. Ag., p. 20, 1906.

Female.—“ Shining black; head broad, posterior orbits dull testaceous; spot beneath eyes, clypeus, labrum, and mandibles, except tips, pale testaceous; wings hyaline, iridescent, base of stigma pale; tegulae and legs pale testaceous, middle of femora more or less, tips of posterior tibiae and tarsi except base, blackish. Length .15 inch” (4 mm.). Original description.

Habitat.—Nevada (Morrison); Washington (Kincaid).

I have not seen the above species. There is a specimen in the Colorado Agricultural College collection which was labeled *albiricta* with a query. It has the posterior orbits black, no pale spot beneath the eyes; base of stigma black, subopaque; length 5 mm. It is probably a good species. It was collected in Larimer Co., Colo., July 2, 1896, by Prof. C. P. Gillette.

7. **Cryptocampus insularis (Kincaid).**

Enura insularis Kincaid, Proc. Wash. Ent. Soc., 1904, p. 352.

Cryptocampus insularis Konow, Genera Insectorum, 1905, p. 51.

“ *Female*.—Length 4.5 to 5 mm.; slender, shining; clypeus very deeply and narrowly emarginate; ridges about ocellar area distinctly raised, but rounded; frontal crest broad, rounded, with a narrow notch in the middle; antennal fovea” (middle fovea) “ small, circular, moderately excavated; antennæ short, slender, third and fourth joints subequal; outer veins of discal cells in hind wings interstitial; stigma rounded at base, tapering to an acute point; tarsal claws slender, subequal; sheath stout at base, rather sharply rounded at apex. Color black; labrum, base of mandibles, tips of coxae, trochanters, tips of femora, tibiae except apices of posterior pair, and anterior and middle tarsi, testaceous.

"*Male*. — Length 4.0; resembles female in general structural characters; antennæ longer, stouter at base, tapering sharply; procidentia well developed, projecting, rounded at the apex; hypopygium sharply rounded at tip. Color black; flagellum of antennæ, labrum, tip of clypeus, base of mandibles, spot beneath eyes extending upwards on inner orbits, testaceous; legs colored as in the female.

"Twelve females and two males, Popof Island, July 9-15.

"Type no. 5301 U. S. National Museum.

"Swept from willow bushes.

"Allied to *Enura salicicola* Smith, but in that species the ridges about the ocellar area are obsolete, the frontal crest is broad and flat and the sheath is broadly rounded at the apex. In both sexes of *Enura salicicola* the antennæ are more or less pallid, while in *Enura insularis* this is true only of the males" (original description).

I have not seen this species, but it should be easily recognized by the above description.

8. *Cryptocampus salicis-nodus* (Walsh).

Enura salicis-nodus Walsh, Proc. Ent. Soc. Phil., vi, 1866, p. 253.

Enura salicis-nodus Nort., Trans. Am. Ent. Soc., i, 1867, p. 52; Trans. Am. Ent. Soc., ii, 1869, p. 368 (Cat., p. 222).

Cryptocampus salicis-nodus D. T., Cat. Hym., i, 1894, p. 278.

Enura salicis-nodus Marl., Tech. Sr. 3, U. S. Dept. Agric., p. 20, 1896.

? *Enura salicis-nodus* Ckll., Ann. and Mag. Nat. Hist., viii, April, p. 336.

[Records gall from Las Vegas, N. M. This is perhaps *propinquus* Roh.]

Cryptocampus nodus Knw., Genera Insectorum, p. 51, 1905 [in a list of species].

Enura salicis-nodus Weldon, Can. Ent., xxxix, Sept., 1907, p. 296. [Gives a description of *macgillivrayi* Roh. under this name.]

Enura s. nodus Jarvis, 38th Annual Rept. of Ent. Soc. of Ontario, 1907, p. 89. [Records the gall from Guelph, Ontario.]

Female. — Length 5 mm.; length of anterior wing 5 mm. Head seen from the side not quickly narrowed toward the top, evenly rounded. Clypeus shallowly, circularly emarginate; lobes broad, obtuse. Antennal foveæ wider below the antennæ, distinct, rather large. Middle foveæ, large, shallow, obtusely pointed toward clypeus, open above. Ocellar basin almost wanting, indicated only by five raised lines. Interocellar furrow broad, not very distinct; lateral ocellar furrow almost wanting, not as plain as the interocellar furrow. Frontal crest not very strong, notched in the middle. Third and fourth antennal joints equal; apical joint equal to or slightly longer than the preceding one, tapering to apex. Ocellar region of the head rather strongly rugose. Middle lobe of mesonotum finely punctured, the middle furrow quite distinct. Mesopleuræ highly polished. Claws deeply cleft, teeth subequal. Venation normal. Sheath broad, straight on the upper margin, obliquely, roundly truncate at the apex. Cerci not extending beyond sheath. Black: head, except a large spot enclosing ocelli (this spot sometimes extends from the antennæ to the occiput) and behind, pronotum, tegulæ, entire legs, ventral part and apical dorsal segments of abdomen, sheath except apex, base of cerci (the abdomen is sometimes entirely rufous-ferruginous),

bright *rufo-ferruginous*. Antennæ rufous beneath. Wings hyaline (but not clear), strongly iridescent; venation pale brown, base of stigma and costa pallid to pale yellowish.

Male. — In general the male agrees with the female. The ocellar basin is indicated by a shallow depression around the anterior ocellus. There is also a depression between the lateral ocelli. The apical antennal joint is shorter than the preceding one. The hypopygium is long, extending beyond the apex of the abdomen and is rather sharp at the apex. The antennæ are largely *rufo-ferruginous*. The stigma is paler brown than in the female.

Habitat. — Ill., N. Y. (Norton); Canada (Jarvis).

The above description was drawn up from a ♂ and ♀ received from the U. S. National Museum.

“The gall is found on *S. longifolia*. A mere gradual enlargement of the twig, from one fourth more than its normal diameter up to twice its normal diameter, almost always without any roughness on the external bark; general color that of the twig.

“*Larva*. — August 23 the larva is 20-footed. Color pale greenish-white, with the mouth dark and the usual eye spots. Length about 0.15 inch” (4 mm.). [Walsh through Norton.]

The bright livery of this species should help in its determination.

9. *Cryptocampus macgillivrayi*, new species.

Enura salicis-nodus Weldon, Can. Ent., xxxix, Sept., 1907, p. 286.

Female. — Length 6 mm.; length of anterior wing 6 mm. Head seen from the side narrowed toward occiput. Clypeus shallowly, circularly emarginate; lobes broad, obtusely rounded. Antennal foveæ large below the antennæ, middle fovea elongate, deep, open at the top. Ocellar basin shallow, large, walls sharply raised. A line-like furrow from lower ocellus to frontal crest. Frontal crest rather strong, slightly broken in the middle. Interocellar furrow wanting; lateral ocellar furrow indicated by a broad, elongate fovea. Third antennal joint slightly longer than the fourth, apical joint tapering, a little longer than the preceding joint. Ocellar area finely granular. Middle lobe of mesonotum finely denticulate, middle furrow strong for anterior half. Mesopleuræ highly polished. Claws deeply cleft, inner tooth much shorter than outer so as to give the appearance of having a large inner tooth. Venation normal or the lower discal cell of hind wings is large and extends beyond the upper. Stigma elongate, rounded on the lower margin, tapering usually to an acute tip, although it is sometimes very slightly truncated. Sheath not very broad, truncated at apex, sides subparallel. Cerci as long as or longer than the sheath. Bright *rufo-ferruginous*; basal two thirds of the antennæ, small spot about ocelli, spot on middle lobe of mesonotum, spot on lateral lobes of mesonotum sometimes, apex of scutellum, metanotum, margins of basal plates and apex of the sheath, black. Wings hyaline, iridescent; venation pale brown, costa and basal two thirds of stigma white.

Male. — Length 5.5 mm.; length of anterior wing 5.5 mm. Head seen from above quadrate, seen from the side not narrowed toward occiput. Clypeus rather

deeply, subangularly emarginate; lobes broad, rounded obtusely at apex. Antennal foveæ very large, extending much above the antennæ. Middle fovea elongate, deep, open at the top. Ocellar basin not as large, and better defined than in ♀; no furrow from lower ocellus. Lateral ocellar furrow stronger in some specimens than in others. Third and fourth antennal joints equal; apical joint tapering, shorter, or occasionally as long as the preceding joint. Sculpture of head and thorax as in ♀. Inner tooth of claws shorter than in ♀. Venation as in ♀. Procidentia rounded at tip, quite prominent. Hypopygium rounded at the tip. Black: head below the antennæ, inner orbits sometimes, posterior and superior orbits broadly, pronotum, tegulæ, legs except extreme bases of coxæ, venter of abdomen (sometimes dusky basally) bright *rufo-ferruginous*. Apical three or four joints of antennæ ferruginous. Wings hyaline, iridescent; venation pale brown, basal half of stigma and basal part of costa pallid to white.

Habitat. — Boulder, Colorado. Many males and females bred from galls on *Salix luteosericea* Rydb. Hatching in laboratory April 12–18, 1907. Two males on foliage of *Salix luteosericea* May 12, 1907 (S. A. Rohwer). Many males bred by G. P. Weldon from galls collected near Ft. Collins, Colorado. Mr. Weldon gives his *Salix* as *S. longifolia*. According to Dr. Rydberg (Bull. 100 of Colo. Ag. Exp. Sta.) *longifolia* does not occur in Colorado, while *luteosericea* is common in northern Colorado and has been taken at Ft. Collins. It is undoubtedly *Salix luteosericea* from which Mr. Weldon collected his galls.

Gall a gradual enlargement of the twig, about 30 mm. long and from 7 to 10 mm. in width. Color that of the twig. Not roughened beyond the character of the dry bark. The small galls contain but one chamber while the larger ones have two larvæ, each in a separate chamber, each chamber having a separate opening. Galls may be found with three larvæ, but all those I examined had either one or two. On *Salix luteosericea* Rydb.

Larva, about time of maturity, about 5 mm. long, of a creamy white color, with a black or dark head.

Pupa a few days before the adult emerges is about 5 mm. long (Mr. Weldon found some which were 6 mm.). For some time after the larval stage the pupa is the same color as the larva, but as the time of hatching approaches it becomes darker. The length of the pupal stage is rather short, in some cases being about two weeks.

In the laboratory the males appeared about the same time as the females, but in the field I found no females until after the males had been out two or three days. However, they may both emerge about the same time, as it is quite possible that I might overlook the female.

Mr. G. P. Weldon recorded a Chalcid and Ichneumonid parasite of this species, but gave no specific determination for either. My friend, Mr. G. M. Hite, had a small Chalcid from the gall of this species this spring. Mr. J. C. Crawford, of the U. S. National Museum, says it is perhaps a new species of the genus *Eurytoma*.

The male is so very much darker and differs in the emargination of the clypeus, and the larger antennal foveæ, also the shorter inner tooth of the claws, that if they had not been reared from the same gall I should hesitate to call them the same. This is a good example of dimorphism of which we have so many examples in sawflies.

At first I took this for *C. s.-nodus* Walsh, but it may be separated from that species by the following characters: ♀, the much lighter color, the thorax being almost entirely rufous-ferruginous; the middle fovea narrower and deeper; the antennal joints are longer; the sheath is more sharply truncate; the ocellar basin is more sharply defined; the inner tooth of the claws is shorter; the stigma is more elongate. ♂, the antennal foveæ much larger; the ocellar basin much better defined; the head relatively larger; the antennæ longer, the joints being much longer; the apical antennal joint about the same length as or longer than the preceding one, etc.

I take great pleasure in naming this after Dr. A. D. MacGillivray, who first told me it was a new species.

Type in the collection of the author.

10. *Cryptocampus bebbianæ*, new species.

Female.—Length 6 mm.; length of anterior wing 6 mm. Head not so strongly narrowed toward the occiput as in *C. orbitalis* Nort. Clypeus subangularly, rather shallowly emarginate; lobes broad, triangular, obtuse at apex. Antennal foveæ large, extending both above and below the antennæ. Middle carina stronger than usual. Middle fovea deep, somewhat crescent-shaped, with a short longitudinal fovea in the center, which extends to the frontal crest which is broken by it. Ocellar basin seldom complete, bounded by line-like ridges which are always present on the lower part, and sometimes rather strong; these ridges run to the frontal crest and form it. Intercellar furrow present and usually rather strong, slightly behind the ocelli; lateral ocellar furrows distinct, usually running to the antennal foveæ. Third and fourth antennal joints equal; apical joint slightly longer than the preceding, scarcely tapering, obtusely rounded at the apex. Head around the ocelli finely granular. Middle lobe of mesonotum closely punctured, without—or it is only slightly visible—a middle furrow. Mesopleurae highly polished. Claws deeply cleft, inner tooth much shorter than the outer. Venation normal or the lower discal cell of hind wings is a little shorter than the upper. Stigma rounded on the lower margin, broadest near base and gently tapering to the apex. Sheath rather broad, obtusely rounded at the apex, straight on the upper margin or slightly emarginate. Cerci tapering, as

long or slightly longer than the sheath above. Black: face below the antennæ, clypeus, labrum, mandibles (apex black), narrow inner orbits, posterior and superior orbits broadly (the lower posterior orbit is sometimes black), posterior angles of pronotum, tegulae, legs (posterior tarsi dusky), abdomen except a broad dorsal band and apex of the sheath, *ferruginous*. Palpi brownish. Apical joints of antennæ beneath sometimes slightly yellowish. Wings slightly dusky hyaline, iridescent; venation brown, costa and base of stigma subpallid.

Male. — Length 5 mm.; length of anterior wing 5.25 mm. Structurally the male is much like the female. The clypeus is sometimes more shallowly emarginate. The frontal crest is hardly broken. The middle fovea is rather shallow and elongate. The furrows and ocellar basin are usually more sharply defined. The orbits are usually black, but sometimes they are ferruginous. The antennal joints are longer; the apical joint is distinctly longer than the preceding one. The apex of the posterior tibiae and their tarsi are black. The abdomen is either entirely black, or only the apical part of the venter is ferruginous. The antennæ are ferruginous beneath. Procidentia broad, rather short, truncate. Hypopygium slightly exceeding the abdomen, rounded at apex. Stigma and costa black.

Habitat. — Boulder, Colorado (S. A. Rohwer). Many males and females bred from galls made on *Salix bebbiana* (?). Hatching April 8–18, 1907.

Gall an abrupt elongate swelling on the twigs of *Salix bebbiana*? Color that of the twig; when green usually smooth, but in drying thrown into shallow, broad wrinkles. It is always monothalamous. Sometimes galls are made on each side of a twig directly opposite, but usually they are made at intervals of two to three centimeters on opposite sides of the twig. In one case a gall on one side of the twig, directly opposite another gall which was matured, was stunted, giving the mature gall the appearance of an abrupt enlargement of the twig at the base, gradually tapering at the apex. When the egg is laid on a very small twig, as it was in one case noticed, the gall is higher, shorter, broader and subovate. The measurements of this gall are as follows: length 11 mm.; breadth 9 mm.; height 8.5 mm. Disregarding the gall just measured, the length varies from 18 to 35 mm., the height at base from 8 to 11 mm., the height at apex from 4 to 6 mm., the width at base from 7 to 12 mm., the width at apex from 3 to 7 mm. The larva works downward, the base of the gall being the largest. In the largest part of the gall where the pupal stage is passed, the chamber is larger.

The *larva* is about 5 mm. long, creamy-white, with a dark brown head. I am not sure that the larva makes the hole through which the adult emerges in this species as it does in *macgillivrayi*, but think that it does not. The hole is on the side of the gall a little way above the base.

The only parasite raised from this species was *Ichneutes fulvipes* Cress., determined by Mr. C. T. Brues.

Thanks are due to Dr. A. D. MacGillivray for telling me this was a new species. I had considered it to be *orbitalis* Nort., to which it is closely related, but it may be separated from this species by the following comparison :

C. orbitalis Nort. ♀.

1. Clypeus deeply emarginate ; lobes rather narrow.
2. Middle carina low, short.
3. Middle fovea large, subquadrate.
4. Frontal crest prominent, rather broadly notched in middle.
5. Stigma not very broad at the base.
6. Venation pale brown.
7. Orbita broadly ferruginous.

C. orbitalis Nort. ♂.

1. Antennæ not reaching beyond the basal plates ; apical joint shorter than the preceding one.
 2. Middle carina broad and low.
 3. Interocellar furrow faint.
 4. Orbita ferruginous.
 5. Stigma white at base.
- Type in the author's collection.

11. *Cryptocampus salicicola* (E. A. Smith).

Enura salicicola E. A. Sm., N. Am. Ent., i, 6, 1879, pp. 41 and 42.

Enura salicicola Cress., Trans. Am. Ent. Soc., viii, 1880, p. 37.

Enura salicicola Thomas, 10th Rept. of State Entomologist Ill., 1880-1881, p. 69.

Cryptocampus salicicola Dalla Torre, Cat. Hym., i, p. 278, 1894.

C. bebbianæ n. sp. ♀.

1. Clypeus shallowly emarginate ; lobes broad, obtusely rounded at apex.
2. Middle carina high, sharp, longer.
3. Middle fovea smaller, somewhat crescent-shaped.
4. Frontal crest not so prominent, very slightly broken.
5. Stigma distinctly broader at the base.
6. Venation brown.
7. Orbita not nearly so broadly ferruginous, inner orbita sometimes black.

C. bebbianæ n. sp. ♂.

1. Antennæ reaching beyond basal plates ; apical joint longer than the preceding one.
2. Middle carina more prominent.
3. Interocellar furrow much stronger.
4. Orbita almost entirely black.
5. Stigma black.

Enura salicicola Marlett, Tech. Ser. 3, U. S. Dept. Ag., p. 20, 1896.

Cryptocampus salicicola Konow, Genera Insectorum, 1905, p. 51.

Female.—Length 5-7 mm. Head seen from the side not abruptly narrowed above, evenly rounded in front. Clypeus deeply, circularly emarginate; lobes narrow, pointed. Middle carina not noticeable. Middle fovea very shallow, elongate, open at the top. Antennal foveæ not at all strong, almost wanting. Ocellar basin very small and shallow, sometimes hardly present. Frontal crest low, unbroken. Inter-ocellar furrow faint; lateral ocellar furrows narrow, deep, distinct, visible from near occiput to antennal foveæ. Antennæ rather slender; third joint slightly exceeding the fourth; apical joint tapering, as long as or slightly longer than the preceding one. Head and thorax finely punctured. Mesopleuræ highly polished, very finely denticulated. Claws minutely cleft. Venation normal; stigma evenly rounded on the lower margin; if anywhere it is broader at the base. Sheath not very broad, straight above, rounded at apex, almost parallel-sided; hairs rather long. Cerci long, tapering. Black: labrum, mandibles, tegulae; angles of pronotum and antennæ brownish. Legs below middle of femora and the trochanters somewhat, brownish-ferruginous. Wings dusky hyaline; venation light brown, base of stigma pale.

Male.—I have not seen the male but Smith described it as follows: "Smaller; head with eyes larger; abdomen nearly black; posterior legs with the femora testaceous throughout, tarsi darker than in the ♀; wings with veins more deeply marked, as also the stigma. Average length 6 mm."

Habitat.—Peoria, Ill. (E. A. Smith).

I regret I am unable to get the original description as it contains a description of the gall and larva. The gall is on *Salix alba*.* *Eurytoma studiosa* Say is parasitic on this species.

The above description of the female was drawn up from two specimens received from the U. S. National Museum. They are darker in parts than Smith's specimens but are undoubtedly the same. She describes the legs as follows: "Coxæ, trochanters and basal half of femora testaceous, the remaining portions much paler."

12. *Cryptocampus niger* (Provancher).

Enura nigra Prov., Addit. Faun. Can. Hym., p. 346, 1888.

Cryptocampus niger Dalla Torre, Cat. Hym., i, p. 277, 1889.

Enura nigra Marl., Tech. Ser. 3, U. S. Dept. Ag., p. 20.

Cryptocampus niger Knw., Genera Insectorum, p. 51, 1905.

Female.—Length 4.5 mm.; length of anterior wing 4.5 mm. Head narrow, not strongly rounded out in front. Clypeus rather narrowly, subangularly emarginate; lobes broad, rounded at the apex. Superclypeal area on each side depressed. Antennal foveæ inconspicuous. Middle fovea almost wanting, indicated by a narrow line. Ocellar basin bounded by rather low walls, the height of which seems to vary in different specimens. Frontal crest low, slightly broken in the middle. Inter-

* *Salix alba* is an introduced species. Is it possible that this may be one of the European *Cryptocampi*, or is it an American form that has taken to this introduced willow?

ocellar furrow wanting; lateral ocellar furrows narrow, deep, extending from near occiput to antennal foveæ. Third and fourth antennal joints equal. Head and dorsulum finely, closely punctured; head perhaps more closely so. Mesopleuræ not as highly polished as usual. Claws cleft, teeth subequal. Venation normal except that the lower discal cell of the hind wings exceeds the upper and in some specimens the intercostal vein is wanting; stigma gradually tapering from near base to apex. Sheath elongate, straight above, regularly rounded at the apex, hairs rather long. Cerci not as long as sheath, not tapering. Black: legs below middle of femora *brownish-ferruginous*; apices of tarsi dusky. Wings hyaline, iridescent; venation light brown, costa and basal half of stigma pallid.

Male. — Unknown to me.

Habitat. — Canada (Prov.) ; Ithaca, N. Y.

The above description was drawn up from two females received from Dr. A. D. MacGillivray.

C. niger resembles *salicicola* E. A. Sm. but is quite distinct.

13. *Cryptocampus brachycarpæ* (Rohwer).

Enura brachycarpæ Roh., Can. Ent., xl, No. 6, June, 1908, p. 176.

Female. — Length 5-5.5 mm.; length of the anterior wing about 5.5 mm. Head seen from the side not abruptly narrowed toward occiput, evenly rounded in front. Clypeus rather deeply, subangularly emarginate; lobes broad, rounded at apex. Antennal foveæ large, broader below antennæ, middle fovea deep, elongate, open at the top. Ocellar basin bounded by sharply raised walls, the lower of which is the higher. Frontal crest rather strong, with three lobes. Interocellar furrow present, not very strong; lateral ocellar furrows broad, but still sharply defined, extending from occiput to antennal foveæ. Head rather sparsely punctured. Furrow of middle lobe of mesonotum distinct but not extending more than half its length. Third and fourth antennal joints equal; apical joint not strongly tapering, equal in length to the preceding one. Mesopleuræ shining. Claws deeply cleft, the inner tooth the shorter. Venation normal. Stigma rounded on lower margin, broadest a little basad to middle. Sheath rather broad, straight on upper margin, rounded at apex, hairs dense and long. Cerci not as long as the sheath above not strongly tapering. Black: lower margin of clypeus, labrum, mandibles, except tips, which are piceous, tegulæ, extreme angles of pronotum sometimes, posterior and superior orbits sometimes, legs below coxae, except line on femora beneath, and apices of tibiae and tarsi sometimes, *rufo-ferruginous*. Apex of venter is in a few cases brownish. Wings hyaline, iridescent, venation brown, costa and basal third of stigma pallid.

Male. — In general the male is much like the female. These differences are to be noted: lateral ocellar furrows are not so strong; the apical four joints of the antennæ are *rufo-ferruginous*; the frontal crest is not trilobate but is notched; the lower discal cell of hind wings sometimes exceeds the upper; the stigma is elongate, obliquely truncate at apex; the inner tooth of claw is shorter. Procidentia rather small, rounded at apex. Hypopygium large, rounded at apex. Length 4-5 mm.

Habitat. — Florissant, Colo. (Roh.); Ute Creek, Costilla Co., Colo., July 7, 1907, alt. 9000 ft. (R. W. Dawson).

The supposed gall of this species is much like the gall of *C. cooperæ* Ckll. It is on *Salix brachycarpa*.

The adult is very different from *C. cooperæ*, easily distinguished by being darker, the different shaped stigma, etc. In color it is much like *C. albirictus* Cress., but is larger. There is no testaceous spot between the eyes, etc.

14. *Cryptocampus parvus* (Rohwer).

Enura minuata Waldon, Can. Ent., Sept., 1907, p. 302, xxxix.

Enura parva Roh., Can. Ent., xl, No. 6, June, 1907, p. 176.

Female. — Length 3.5 mm.; length of anterior wing 3.5 mm. Head seen from the side is gently rounded in front. Clypeus rather shallowly, circularly emarginate; lobes broad, subobtuse. Antennal foveæ not strong. Middle fovea rather deep, elongate. Ocellar basin wanting. Above the frontal crest there is a shallowly depressed area. Frontal crest rounded, very gently emarginate in the middle. Ocellar furrows not strongly defined, almost wanting. Third and fourth antennal joints equal; apical joint tapering, equal in length with the preceding; fourth and fifth joints with a little spine at apex above. Head and dorsulum finely, closely punctured. Claws minutely cleft; teeth equal or subequal. Venation normal. Stigma rounded on lower margin, rather acuminate. Sheath straight above, parallel-sided, rounded at the apex; hairs rather long and dense. Cerci slightly tapering, longer than the sheath above. Dark brownish-black to black; face below frontal crest, clypeus, labrum, mandibles (apices piceous), inner orbits narrowly, posterior and superior orbits broadly, angles of pronotum, tegulae, legs entirely, abdomen except a broad brownish band above and the sheath, reddish-yellow. Antennæ brownish beneath. Wings hyaline, not strongly iridescent; venation pale brown, costa and stigma pallid.

Habitat. — Ft. Collins, Colo. (April and May).

This species should be easily recognized by its small size. It is most closely related to *s.-nodus* Walsh, but is quite distinct from that species.

15. *Cryptocampus maurus*, new species.

Female. — Length 4 mm.; length of anterior wing 4 mm. Head rounded, rather small. Short, robust species. Clypeus shallowly emarginate; lobes broad, rounded at apex. Antennal foveæ large, deep, broader above the antennæ. Middle fovea distinct, elongate, open above. Ocellar basin shallow, walls low, rounded. Frontal crest deeply notched. Interocellar furrow evident; lateral ocellar furrows distinct from level of ocelli to antennal foveæ. Antennæ rather short; third and fourth joints equal; apical joint slightly rounded beneath, equal in length to preceding ones. Head rather finely, closely punctured. Dorsulum shining. Claws deeply cleft, inner tooth shorter. Venation of fore wings normal; upper discal cell of hind wings small, greatly exceeded by the lower one on the outer margin. Stigma broadest at base, tapering to apex. Sheath distinctly emarginate above, broad at base, long, obliquely tapering to a rounded apex. Cerci as long as sheath above, thick for basal third, thinner the rest of the way. Black: labrum, mandibles, legs below femora (tarsi in-

fuscated), and trochanters brownish. Wings hyaline, somewhat iridescent; venation brown, basal half or third of stigma subpallid.

Male.—Length 3.75 mm.; length of anterior wing 4 mm. Robust. In general much like the female, but differs as follows: Antennæ longer; walls of ocellar basin sharply defined; interocellar furrow placed near occiput and stronger; lateral ocellar furrows distinct to occiput; head more distinctly punctured; stigma broader and rounded on the lower margin. Procidentia rather small, truncate at apex. Hypopygium obtusely rounded at apex, rather large.

Habitat.—A ♂ and ♀, Tolland, Colo., alt. 8889 ft., June 7, 1908 (S. A. Rohwer). Swept from *Salix* sp. A very distinct species. Type in the author's collection.

16. *Cryptocampus propinquus*, new species.

Enura orbitalis Ckll., The Southwest, Vol. 2, 5 March, 1900, p. 113.

Male.—Length 5 mm.; length of anterior wing 4.5 mm. Head seen from the side rounded in front. Clypeus very shallowly emarginate; lobes low and broad. Antennal foveæ large, deep. Middle fovea distinct, elongate, open at the top. Ocellar basin with low but sharply defined walls. Interocellar furrow distinct; lateral ocellar furrows deep, distinct from occiput to antennal foveæ. Antennæ wanting in the type. Head closely and rather coarsely granular. Dorsulum not as coarsely sculptured as head, apparently punctured; furrow of middle lobe of mesonotum distinct for half the length of the dorsulum. Claws not very deeply cleft; teeth subequal. Venation normal. Stigma a little wider at base, gently tapering to the apex. Procidentia rather broad, rounded at angles, truncate across apex. Hypopygium rather sharper at the apex than usual. Black: lower margin of clypeus, labrum, mandibles, (apices piceous), lower inner orbits, middle carina, superior and upper posterior orbits, spot on angle of pronotum, tegulæ, legs below coxæ (apex of posterior tibiæ and their tarsi infuscated), apical part of venter of abdomen, bright reddish-yellow. Wings hyaline, iridescent, venation brown, including the stigma.

Habitat.—Near Las Vegas, N. M. (Mary Cooper). “*Salix* gall 61.”

Gall an enlargement of twig, abruptly so at base. The gall before me contained two insects and is not evenly developed on both sides. It reminds me of the abnormal gall of *C. bebbianæ* Roh. It is on *Salix* sp. (The bark when dry is brownish-red.) If this gall is an abnormal one and as a rule is an abrupt, lateral, elongate swelling, the species is most closely related to *bebbianæ* Roh., from which it may be separated by the foregoing table. If the gall is normal it is related most closely to *macgillivrayi* Roh., from which it may be known by the dark stigma, the deep lateral ocellar furrows, the more shallowly emarginated clypeus, etc.

Type in the author's collection.

17. *Cryptocampus perditus* (Rohwer).

Enura perdita Roh., Can. Ent.

The description of this species has been sent to the "Canadian Entomologist." The only specimen I have is a male without a head. It may be briefly characterized as follows: Black, opaque; tegulae, extreme angles of pronotum, legs orange-color or almost that dark. Venation normal, pale brown; stigma a little paler at base, obliquely truncate at apex with the lower margin rounded. Procidentia narrow, truncate at apex; hypopygium obtuse at apex.

Habitat. — Delta and Ft. Collins, Colo. Type in the collection of the Colorado Agricultural College.

A very distinct species easily separated by the foregoing table.

A SMALL COLLECTION OF ANTS FROM VICTORIA, AUSTRALIA.

BY WILLIAM MORTON WHEELER,
BOSTON, MASS.

The following ants were collected by Mr. Charles F. Rawsey at Camberwell, Victoria, in a "hot, fairly dry, hilly area, with sandy (granite) soil and poor, scrubby vegetation ('box-timber')." There are no new species in the collection, but as it comprises a few hitherto unknown sexual forms, was made in a new locality, and is accompanied by some interesting notes, it is well worth recording.

PONERINÆ.

1. *Ectatomma (Rhytidoponera) scorus* Forel.

Worker. — Length 11–13 mm.

Head longer than broad, somewhat broader in front than behind, with straight, subparallel sides, excised posterior margin, prominent, slightly recurved infero-posterior angles and a prominent, transverse postocular crest, obtusely angular on the sides and interrupted in the middle. Eyes large, very prominent, hemispherical, just behind the middle of the head. Mandibles flattened, with deflected, pointed tips and straight inner borders furnished with numerous teeth of different sizes and irregular distribution. Clypeus broadly rounded in front. Frontal carinae continued back to the middle of the head. Frontal area distinct. Antennal scapes surpassing the corners of the postocular crest by about one third their length. Funicular joints slender, second joint longer than first. Pronotum behind with an indistinct protuberance on each side and an acute anteriorly directed spine on its antero-inferior corner. Pro-mesonotal and mesoepinotal sutures distinct but only slightly impressed. Petiole from above one and one half times as long as broad, about twice as broad through the node as through the peduncle; in profile with a powerful, downwardly-directed anteroven-

tral spine, and with flattened, vertical anterior and posterior surfaces and horizontal dorsal surface to the node. Seen from behind the node is evenly rounded on the sides and above. Gaster rather short, convex dorsally, with subequal first and second segments. Legs rather long.

Subopaque; mandibles densely and finely striated and sparsely punctate. Clypeus and upper surface of head coarsely rugose and covered with gross foveæ which often lie in rows between the rugæ. The latter are longitudinal on the clypeus and front, but transverse on the occiput. Cheeks opaque, granular, with smaller and more scattered foveæ. Thorax and coxae granular, the former transversely rugulose with scattered foveæ like those on cheeks. Petiole a little smoother and more shining, with shallower foveæ. Gaster coarsely shagreened and sparsely punctate, the first segment arcuately and finely rugulose.

Hairs fulvous, short, erect; scattered on the body, somewhat more conspicuous on the legs and antennal scapes.

Piceous black; mandibles, maxillæ, tip of gaster, antennæ and legs, including the coxae, reddish.

Male. — Length 11 mm.

Head, including the eyes, about as long as broad, rounded behind, without any traces of the posterior angles or postocular crest. Mandibles well-developed, similar to those of the worker. Antennæ long and slender, scapes fully two thirds as long as the second funicular joint, first funicular joint as long as broad; joints 2-12 elongate, gradually diminishing in length distally. Pronotum with prominent inferolateral spines like the worker. Mesonotum and scutellum convex; epinotum flattened as in the worker. Petiole about two and one half times as long as broad, but little narrower in front than behind, with prominent ventral spine and anterosuperior angles and a low, rounded node. Gaster more slender than that of worker. Legs long and slender.

Opaque; mandibles finely and densely striated. Head and clypeus reticulaterrugulose throughout, the former foveolate posteriorly. Pronotal sculpture like that of the worker. Remainder of thorax more coarsely reticulate-rugose than the head, rugæ on base of epinotum longitudinal. Petiole and gaster somewhat shining, shagreened.

Pilosity and color as in the worker, posterior gastric segments broadly yellow at the base. Wings infuscated, with black stigma.

Six workers and two males, taken from a "small, red mound in clay soil. Digging disclosed a mass of small twigs or pieces of sticks, apparently arranged in order and covered and intermixed with clay to produce a regular formation, possibly for roofing or giving stability. Slaters [land Isopods] were found in the chambers with the ants, also a few workers of white ants."

This species, which is allied to *E. scabrum* Mayr, *mayri* Emery and *cristatum* Mayr, was based on workers from Charters Towers, Queensland (Forel, Ann. Soc. Ent. Belg., XXXVIII, 1894, p. 236).

2. *Ectatomma (Rhytidoponera) metalicum* F. Smith.

Eight workers and a male. According to Mr. Rawsey, the sting

of this species, which is often found associated with *Cremastogaster rufotestacea* and *Iridomyrmex detectus*, especially in inhabited or deserted nests of the latter species, is "followed by a slightly painful and persistent itch."

3. **Myrmecia nigriceps Mayr.**

Four typical workers.

4. **Myrmecia pyriformis F. Smith.**

Seven workers and two large larvæ. This is the "black bull-ant" and, according to Mr. Rawsey, is much less abundant in the mountains of Victoria than the preceding species, "the red bull-ant." The larvæ resemble those of *M. gulosa* in my collection and are shaped like the larvæ of *Stigmatomma pallipes*. They are fully 2 cm. long, non-tuberculate and covered with short, sparse hairs.

MYRMICINÆ.

5. **Cremastogaster sordidula dispar Forel.**

Five workers, two females and three males which agree perfectly with Forel's description. There is no trace of a longitudinal furrow in the postpetiole of the worker. The specimens were "turned up accidentally in a spadeful of earth."

DOLICHODERINÆ.

6. **Tapinoma minutum Mayr.**

Several workers and two deälated females. The latter measure 4.5 mm. and are very slender. "Obtained from a mound 1 ft. by 1½ ft. in diameter, at foot of gum-tree."

7. **Iridomyrmex detectus F. Smith.**

Six workers and two males. This beautifully iridescent species seems to be common in all parts of Australia and does not vary to any considerable extent. It builds large, sandy mounds, sometimes several feet in diameter. Mr. Rawsey "counted 17 such mounds connected on a hot day by one stream of ants," indicating that a single colony extends over several nests. He states that the workers are harmless, *i. e.*, do not sting and that their bite is a "mere pinch."

8. **Iridomyrmex bicknelli Emery.**

Nine workers without noticeable differences from the typical form of the species. Taken from nests "at roots of 'tussock' (a poor, but clumpy grass)."

9. *Iridomyrmex nitidus* Mayr.

Worker. — Length 4.5–5 mm.

Head, excluding the mandibles, about one fourth longer than broad, narrowed posteriorly and anteriorly. Posterior margin clearly excised. Eyes distinctly in front of the middle. Mandibles with numerous teeth. Clypeus with broadly rounded anterior margin. Frontal area large, and, like the frontal groove, indistinct. Antennal scapes surpassing the posterior corners of the head by about one sixth their length; joints 1, 2 and 11 of the funiculus fully twice as long as broad, remaining joints but little longer than broad, subequal. Thorax slender, pronotum distinctly narrower than the head, somewhat protuberant but flattened, broader than long; mesonotum regularly elliptical, one and one half times as long as broad. Mesoepinotal constriction deep and broad, flattened at the bottom. Epinotum long, with subequal base and declivity, the former flat in profile and falling off abruptly in front, with a vertical surface as long as the length of the mesoepinotal depression with which it forms a right angle. Declivity forming a rounded, obtuse angle with the base. Petiole higher but narrower than the epinotum, with flattened posterior and slightly convex anterior surface and rounded border, slightly produced in the middle above. Legs rather long.

Smooth and shining throughout; very finely, sparsely, and indistinctly punctate; mandibles subopaque, more densely but finely punctate.

Hairs and pubescence grayish, the former short, suberect or erect and scattered, longer on the trunk, inconspicuous or lacking on the antennal scapes and legs. Pubescence very sparse, most distinct on the gaster, but not concealing the shining surface.

Dark chestnut brown; mandibles, clypeus, tarsi, articulations of legs, neck, mouth-parts, lower surface of head, thorax and petiole, brownish-yellow.

Female. — Length 8.5 mm.

Head similar to that of worker, but with somewhat sharper posterior corners and the clypeus bluntly but distinctly carinate. Thorax long and through the wing insertions considerably broader than the head. Prothorax with rounded sides sloping gradually forward to the neck. Mesonotum longer than broad. Epinotum rounded, without distinct basal and declivous surfaces. Petiole thick anteroposteriorly, especially at the base, but becoming suddenly more attenuated towards the apex in profile, with flattened posterior surface and faintly notched superior border. Legs long and stout.

Less shining than the worker; finely and indistinctly punctate. Mandibles subopaque and densely punctate.

Hairs and pubescence grayish, both much more abundant than in the worker and concealing the shining surface. The scapes and legs with erect hairs like those on the body.

Dark chestnut brown, nearly black, mandibles, clypeus and tarsi reddish. Anterior half of pronotum dull orange. Wings smoky brown, with brown veins and stigma and a single cubital cell.

Male. — Length 3.5 mm.

Head, excluding the mandibles, a little longer than broad, subrectangular. Mandibles bidentate, the terminal tooth very long and acute; eyes in front of the middle; cheeks short, slightly concave; posterior corners of head rounded; clypeus

like that of the worker. Antennæ with scape nearly as long as the funicular joints 1 and 2 together, first funicular joint a little longer than broad, remaining joints cylindrical, growing shorter distally. Thorax robust and very convex in the pronotal region, which is distinctly longer than broad. Scutellum projecting, nearly as long as broad. Epinotum similar to that of the female. Petiole like that of the worker. Outer genital lamellæ triangular, with broadly rounded tips, median appendages with finger-shaped process bent at a right angle, inner appendages somewhat uncinate, convex dorsally and concave ventrally.

Shining, sparsely and very finely punctate, mandibles and clypeus more densely punctate.

Deep black, antennæ and legs piceous, wings considerably paler than in the female.

Described from six workers and single male and female specimens, "found inside bark of dead bottle-brush; characteristic rank smell very strong."

CAMPONOTINÆ.

10. *Acantholepis (Stigmacros) clivispina* Forel.

Six workers and a deälated female agree very well with Forel's description of this species. They were found in the "deserted portion (old workings) of a white ant's nest."

11. *Camponotus nigriceps* F. Smith.

"Several soldiers and workers. This ant is the 'sugar ant' commonly found in houses, but it comes forth to forage in the evening. The specimens sent were found remote from towns." Among these was a female specimen of a small myrmecophilous cricket (*Myrmecophila australis* Tepper).*

12. *Camponotus testaceipes* F. Smith.

Soldiers, workers, males and a female from two colonies. Two Jassids (one immature) were found associated with the specimens in one of the nests.

* See Tepper, Note on a Genus of Gryllidæ new to South Australia, and description of a new species of Myrmecophila, Trans. Roy. Soc. S. Austr., XX, 1896, pp. 149-151.

A SHORT SYNOPSIS OF THE SPECIES OF OCHODÆUS INHABITING THE UNITED STATES.

BY H. C. FALL,

PASADENA, CAL.

Including the two new species described in the present paper, the number of species of *Ochodæus* known from within our faunal limits is now nineteen. As the last review of the genus, that by Dr. Horn in the Transactions of the Am. Ent. Soc., 1876, dealt with only eight species a new synoptic table is believed to be opportune, and in order that the student may be for many purposes relieved of the necessity of consulting the scattered descriptions, reference is made to the principal distinguishing characters of all previously described species.

In the following table I have drawn less upon the form of the mentum, and more on the cephalic armature and form of the sutural angle of the elytra, as these latter characters may be more quickly and accurately verified, the true form of the anterior portion of the mentum being frequently difficult of determination. The order of species will therefore be found to differ somewhat from that of Horn.

TABLE OF SPECIES.

1. Elytra punctate striate.....	2.
Elytra not punctate striate.....	9.
2. Mentum elevated in the form of a transverse wedge.	
Prosternum strongly lobed in front, external outline of mandibles broadly arcuate, sutural angle of elytra dentiform, basal joint of hind tarsi thickened, arcuate and longer than the following joints united.....	1. <i>pectoralis</i> Lec.
Prosternum not lobed in front, external outline of mandibles ogival, sutural angles of elytra not dentiform, basal joint of hind tarsi slender and shorter than the remainder.....	2. <i>gnatho</i> Fall.
Mentum flat or concave.....	3.
3. Front or clypeus not at all tuberculate.....	4.
Front with a distinct more or less acute or dentiform tubercle, except in <i>præsidii</i> ...7.	
4. Sutural angle of elytra not dentiform.....	5.
Sutural angle of elytra dentiform; upper tooth of front tibiæ nearer to the middle tooth than to the base.....	6.
5. Vertex not carinate; mentum deeply longitudinally impressed; elytral striæ feebly impressed and finely punctured.	
Posterior tibiæ of male with an acute tooth at middle, posterior femora of male without apical tooth.....	3. <i>simplex</i> Lec.

Posterior tibiæ of male with a more or less sharply defined tooth or angulation at apical fourth; posterior femora with unciform tooth at apex.

4. *planifrons* Schaef.

Posterior tibiæ of male "slightly dilated at middle"; posterior femora not toothed at apex.....5. *ulkei* Horn.

Vertex with more or less distinct short transverse carina; elytral striæ more deeply impressed and less finely punctured.

Mentum as long as wide, rather deeply longitudinally impressed in front, more broadly so posteriorly; posterior femora of male with apical unciform tooth; posterior tibiæ of male with an acute tooth just behind the middle.

6. *musculus* Say.

Mentum transverse, not impressed, posterior femora of male toothed at apex; posterior tibiæ of male simple.....7. *striatus* Lec.

6. Color uniform, but varying from brownish to testaceous.

Vertex of male with a transverse carina, which is feebler or sometimes lacking in the female.

Vertical carina short, interrupted at middle; frontal lobe not margined.

8. *inarmatus* Schaef.

Vertical carina longer, not interrupted at middle; frontal lobe strongly margined.....9. *kansanus* sp. nov.

Vertex not carinate in either sex.

Frontal margin (male) elevated each side into a small acute tubercle; hind femora of male toothed on lower edge at apical third.10. *biarmatus* Lec.

Frontal margin and hind femora simple in both sexes.

11. *peninsularis* Horn.

Head and thorax black, elytra dull brownish yellow, under surface and legs piceous.....12. *californicus* Horn.

7. Front not distinctly tuberculate, the upper or posterior cariniform margin of the frontal lobe merely a little more prominent at middle; hind tibiæ flattened, parallel, and about one third as wide as long (male).....13. *præsidii* Bates.

Front tuberculate.....8.

8. Frontal lobe broad, the tubercle at the anterior margin.

Hind tibiæ broadly flattened and compressed, about one half as wide as long (male).....14. *repandus* sp. nov.

Hind tibiæ normal.....15. *nimius* Fall.

Frontal lobe more strongly advanced, the tubercle more or less remote from the margin.

Mandibles almost evenly arcuate externally, frontal lobe truncate.

16. *frontalis* Lec.

Mandibles subangulate and sinuate externally, frontal lobe arcuate.

Mentum rather deeply emarginate at apex, the lateral angles acute; frontal tubercle strongly developed, forming a short stout horn.

17. *mandibularis* Linell.

Mentum with a small faint emargination at apex, the lateral angles rounded; frontal tubercle small.....18. *sparsus* Lec.

9. Form elongate; hind trochanters spined, one spur of both middle and hind tibiæ pectinate.....19. *estriatus* Schaef.

1. *O. pectoralis* Lec., Trans. Am. Ent. Soc., 1868, p. 51.

The mental wedge is in this species as wide at summit as at base, the summit not or but feebly emarginate, the front face longitudinally a little concave, the rear face nearly flat. Using the phraseology of Dr. Horn the clypeal margin is narrowly double; that is to say, it is slightly thickened or elevated with a well defined upper margin. The head is without elevations. Length 6.5-7.5 mm.

The species is rare in collections and I have seen only males. It occurs in New Mexico and Arizona.

2. *O. gnatho* Fall., Trans. Am. Ent. Soc., 1907, p. 247.

The mental wedge is much thinner at base (from front to back) than in *pectoralis*, the summit emarginate and much narrower than the base, the front face concave from top to bottom instead of from side to side. There is a small tubercle at the middle of the clypeal margin and behind this there is a slight concavity. The extraordinary width of the head in conjunction with the strongly produced mandibles constitute the most striking features of this species; the prothorax is also relatively wider as compared with the elytra than usual. The following measurements (in hundredths of an inch) express these relations exactly, like measurements of my single example of *pectoralis* being given for comparison.

	<i>Gnatho</i> (type). New Mexico.	<i>Gnatho</i> . Yuma, Ariz.	<i>Pectoralis</i> .
Width of head.....	10.1	7.8	6.8
" prothorax.....	13.9	10.2	11.3
" elytra.....	13.7	10.4	13.9
" head relative to that of elytra..	.73	.73	.49

The type from Mesilla, New Mexico, and several nearly similar examples from Yuma, Arizona, are all that are known to me. The length varies from 5.5 to 7.5 mm.

3. *O. simplex* Lec., Proc. Acad., 1854, p. 222.

No male of this species is at hand and the tabular characters are taken from Horn's Synopsis. The propygidal carinae are said by Horn to be exactly parallel, but I find them to be a little divergent in front, though very nearly parallel posteriorly. The upper tooth of the front tibia is small and much nearer the base than to the median tooth. The elytral intervals are wide, the striæ very feebly impressed and the striae punctures less conspicuously larger than those of the in-

tervals than in the greater number of species. The length as given by LeConte is 8 mm.; by Horn 5-6.5 mm., but it must be remembered that the measurements of the latter author extend from the anterior margin of the prothorax to the tip of the elytra only.

The species is known from Texas, New Mexico, Colorado and Nevada.

4. *O. planifrons* Schaeff., Can. Ent., 1906, p. 269.

In the single male example at hand, the elytral striæ are feebly impressed, the intervals nearby flat and the striae punctures but little larger than those of the intervals. The mentum is deeply longitudinally impressed, the channel of nearly equal width throughout. According to Schaeffer the female differs from the male in having the hind tibiae simple, the hind femora with a smaller and more obtuse apical tooth, and the clypeus slightly broader. The species is of average size; it occurs in the Huachuca Mts. of southern Arizona.

5. *O. ulkei* Horn, Trans. Am. Ent. Soc., 1876, p. 182.

This species was described from a single specimen from Nevada in the Ulke collection, and I have not been able to obtain an example. There is in the LeConte collection a New Mexican specimen placed beside the *ulkei* label which I suspect is the real thing. It has the simple head and nearly parallel propygidal lines as described by Horn, and the hind tibiae are obtusely angulate on the lower edge behind the middle (said in the description to be slightly dilated at the middle). In common with the two preceding species, the elytral striæ are feeble and unusually finely punctate. The longitudinal impression of the mentum is "very deep, the angles elevated when viewed from beneath and the tip not perceptibly emarginate." Horn gives the length as 5 mm.

6. *O. musculus* Say (*Balboceras*), Boston Jour., 1837, p. 178.

Opacus Lec., ♀, Trans. Am. Ent. Soc., 1868, p. 51.

Americanus Westw., Trans. Ent. Soc. London, Ser. II, 2, p. 66.

There are no characters of importance to add to those used in the synoptic table. The species is of medium size and of a rather dark ferruginous brown color when mature. It is a well known species of more eastern range than any other—if we except the Florida record for *frontalis*—and with this exception is the only species that has occurred east of the Mississippi. Horn records it from Michigan, Dakota and Nebraska; it is known to me also from western Indiana, Illinois, Kansas and Manitoba (Winnipeg).

7. O. striatus Lec., Proc. Acad., 1854, p. 222.

Size, color and form of *musculus*, the frontal lobe is not margined, however, and the elytral striae are better marked than in *musculus*. The species seems to be rare in collections. There are two examples in the LeConte collection, both from Arizona. Horn gives also New Mexico.

8. O. inarmatus Schaeff., Can. Ent., 1906, p. 270.

A rather large species, though as usual variable in size, of a brownish ferruginous color as in *musculus*. Schaeffer describes the mentum as being "deeply longitudinally impressed from base to apex," but in my only representative of the species it would be more accurately described as flat posteriorly, deeply abruptly impressed in front, the channel narrowing and growing shallower behind, disappearing before reaching the basal margin. The femora and tibiae are entirely unarmed in all known specimens and Mr. Schaeffer remarks that what he takes to be the females differ from the males only in having the head less distinctly carinate and hardly at all impressed before and behind the carina. The teeth of the anterior tibiae are subequidistant, the upper tooth well developed and much more remote from the base than from the middle tooth. My single example measures 7.5 mm. in length. The species occurs in the Huachuca Mts. of Arizona.

9. O. kansanus, new species.

Oblong oval, moderately robust, testaceous, with short semi-erect pale hairs. Labrum moderately emarginate. Mentum longitudinally impressed from apex to base, the channel broader and less deep posteriorly. Frontal lobe with strong cariniform upper margin, vertex with a smooth transverse carina which is longer and well developed in the male, shorter and less developed or subobsolete in the female, head scarcely granulose, the punctures not dense and nearly simple, at least in the male. Prothorax not quite twice as wide as long, surface moderately densely granulose, median line feebly impressed in posterior half. Elytra about one eighth longer than wide, twice as long as, and not or but very slightly wider than the prothorax; striae moderately impressed, the intervals irregularly, subtriserately punctate, the punctures nearly as coarse as those of the striae; sutural angle dentiform. Upper tooth of front tibiae strong, remote from the base, and rather nearer the middle tooth than the latter is to the apical one. Femora and tibiae simple in both sexes. Basal joint of hind tarsus subequal in length to the three following. Length 4-6 mm.; width 2.2-3.3 mm.

Habitat. — Hamilton Co., Kansas (Snow); McPherson, Kansas (Knaus); Las Vegas, New Mexico (Fenyes).

This species is apparently not rare in Kansas, at least it has been taken in considerable numbers both by the late Professor Snow and by Mr. Knaus. It has perhaps been confused in collections with *biarmatus*. I have considered the possibility of this species being the *duplex* of LeConte, unrecognized by Horn, who at the time of writing declared that he could find no type. The brief tabular characters given by LeConte constitute the only description and are as follows: "Middle lobe of front scarcely or not at all margined; elytral striae deep, strongly punctured, head with two transverse ridges." The size is given as 6 mm. and the type is said to be from Texas (Ulke Coll.). In *kansanus* the front is very distinctly margined and the elytral striae are not especially strongly punctured; there is therefore little probability that the two are identical. I however wrote to Dr. Holland, of the Carnegie Museum, asking if the Ulke collection contained the type of *duplex*, but have received no answer to my communication.

It is a fact worthy of remark that in all our species having the sutural angle dentiform, the upper tooth of the front tibiæ is nearer to the middle tooth than to the base of the tibia. Of the other species represented before me (*ulkei*, *striatus* and *estriatus* lacking) this is true only of *pectoralis*.

10. *O. biarmatus* Lec., Trans. Am. Ent. Soc., 1868, p. 51.

One of our smallest species and in my experience the one most abundantly represented in collections. Horn remarks that the sexes are alike in having a tooth on the lower edge of the hind thighs at about one third from the knee. My own observation is that this tooth is present only in the male. This species is the only one in our fauna having the frontal margin terminating each side in an acute tubercle in the male. The species occurs in Kansas, Texas and New Mexico.

11. *O. peninsularis* Horn, Coleop. of Baja Cal., Suppl. I, Proc. Cal. Acad. Sci., V, 1895, p. 224.

Of this species Horn writes: "Most closely related to *biarmatus* and more especially to the female (of the latter) which has not the clypeal tubercles of the male." He finds no armature of either femora or tibiæ, but in certain specimens which he assumes are males, the hind tibiæ appear somewhat shorter and more hairy. The size given is 4.5-5 mm.

Habitat. — Lower California (San Lazaro and Sierra El Taste).

12. *O. californicus* Horn, Proc. Cal. Acad. Sci., V, 1895, p. 224.

This rare little species may be recognized instantly by its color, which is unique in the genus. The mentum is wider than long, sides parallel, apex a little emarginate, the lateral angles rounded, surface rather broadly and moderately deeply impressed in front, becoming nearly flat toward the base. The frontal lobe is distinctly margined, the vertex with a short obtuse carina, which is slightly impressed at middle. The type of the species was sent by the writer to Dr. Horn who states that it is a female, the head without ridges and the clypeal margin not reflexed. The three examples before me are perhaps all males, though there is no armature of the legs or other indications of sex. The size varies but little, the length ranging from 4 to 4.5 mm. All examples known to me have been taken either by Dr. Fenyes or the writer, and all occurred flying low over country roads by day, and their behavior and in fact the facies of the beetle strongly suggest *Onthophagus*. The other species of the genus so far as I am aware fly only at night and are often attracted to lights. *Californicus* has been taken in April and May at Pomona and Pasadena in southern California, and it, with the anomalous *estriatus* constitute the only representatives of the genus in the Pacific fauna.

13. *O. præsidii* Bates, Biol. Cent. Am. Coleop., II, pt. 2, p. 106.

This species is best recognized by the form of the hind tibiæ in the male, as indicated in the table. One other species — *repandus* — possesses this character in a still greater degree, but this latter has a well developed frontal tubercle. In *præsidii* the so called upper margin of the frontal lobe is rather widely separated from the true margin, and might be described as a transverse frontal carina which is elevated a little at the middle and at each extremity. There is in some specimens a very feeble and obtuse vertical carina which is entirely lacking in others. The mentum is as long as wide, impressed only in front. The hind femora of the male have a strong unciform apical tooth. The females differ according to Schaeffer in having the hind femora and tibiæ less broad, and the femoral apical tooth smaller. Occurs in the Huachuca Mts. of Arizona; I have also a male from New Mexico.

14. *O. repandus*, new species.

Robust, rufo- or fulvotestaceous, clothed as usual with short erect fulvous hairs. Labrum very feebly emarginate. Mandibles feebly sinuate externally. Mentum as long as wide, narrowed in front, impressed only for a short distance at the apical

margin which is but slightly emarginate. Frontal lobe broadly arcuate, a strong tubercle at the middle of the margin, which is not distinctly reflexed. Vertex with short transverse carina. Prothorax three fifths as long as wide, sides strongly rounded, surface moderately densely granulate-punctate, median line rather deeply impressed in basal half. Elytra about twice as long as and not appreciably wider than the prothorax; striæ well impressed, striae punctures moderate; sutural angle not dentiform. Upper tooth of front tibia small and remote from the middle tooth. Hind thighs with an acute unciform apical tooth, and another equally acute at the apical third. Hind tibiæ broadly flattened and compressed, subparallel, nearly one half as wide as long. Basal joint of hind tarsus slender and as long as the three following. Length 7.5 mm.; width 4 mm.

Described from two males taken by Prof. F. H. Snow in Cochise Co., Arizona, one labeled "Douglass," the other "San Bernardino Ranch, 3,750 ft."

This species is allied to *præsidii* in the expanded hind tibiæ, and to *frontalis* in the form of the mentum and armature of the posterior femora, from both of which it is easily distinguished by the tabular characters.

15. *O. nimius* Fall., Trans. Am. Ent. Soc., 1907, p. 248.

One of our smaller species, similar in size, form and color to *biarmatus*, though not closely related to that species structurally. In its strictly marginal clypeal tubercle it differs from all our species except *gnatho* and *repandus*, the former differing conspicuously by its remarkable mentum and broad head, the latter by its broad flattened hind tibiæ. By its flat and strongly transverse mentum *nimius* is allied to *striatus* and *sparsus*, and by its rather strongly produced mandibles with distinct external angulation and sinuation it resembles *sparsus* and *mandibularis*. The elytral striæ are coarsely punctate, the intervals rather narrow with no more than two punctures in their width. The unique type was taken at light at Mesilla, New Mexico, by Professor Cockerell.

16. *O. frontalis* Lec., Smith. Miscel. Coll., 1863, p. 76,
Complex Lec., Trans. Am. Ent. Soc., 1868, p. 51.

Species of medium size. Mentum as long as wide, nearly flat, a feeble impression in front only. Frontal lobe only moderately advanced, broadly truncate, the tubercle near the frontal suture; vertex transversely carinate. In the male of this species the femoral armature reaches its maximum development, the front and middle as well as the hind thighs having an unciform tooth at apex, the hind thighs an additional acute tooth at apical third, and the front thighs a small tooth

at middle, these latter lacking in some less developed specimens according to Horn. In the female the femora are unarmed.

The type of *frontalis* is in the Ulke collection; it is from Texas. The type of *complex*—from New Mexico—in the LeConte collection bears the label *frontalis* in Horn's handwriting, and with it are three examples from Columbus, Texas, collected by Hubbard and Schwarz. According to Horn the species occurs also in Florida.

17. *O. mandibularis* Linell, Proc. Nat. Mus., 1895, p. 723.

Length 5.75–7.5 mm. The form of the mentum in front is apparently as described in the table, but is very difficult to see because of the numerous hairs. The tabular characters are sufficient for the recognition of this species, which is not closely related to any other except *sparsus*, from which—if we except the somewhat difficult mental character—there is little to depend upon. The size averages greater in *mandibularis* and the prothorax is a little less transverse. The type was described from Winslow, Arizona; it is also known from Las Cruces, Deming and Albuquerque, New Mexico.

18. *O. sparsus* Lec., Trans. Am. Ent. Soc., 1868, p. 51.

The prothorax is shorter in this species than in any other of our forms, being distinctly more than twice as wide as long. The cephalic tubercle is even a trifle more posterior in position than in *mandibularis*, being quite as remote from the frontal margin as from the base of the occiput. The elytral striae are finer and less impressed than in *mandibularis* and the punctures of the intervals are sparse and scarcely at all asperate, not very different however from *mandibularis*, in this latter respect. The type—length 5 mm.—is from Cañon Blanco, New Mexico. I have a single example—length 5.3 mm.—from Thornton, New Mexico, collected by Dr. Fenyes.

19. *O. estriatus* Schaeff., Can. Ent., 1906, p. 271.

This remarkable species is based upon a specimen taken at Millwood, Fresno Co., California. Mr. Schaeffer places it provisionally in *Ochodæus*, stating that a new genus may yet have to be erected for it. Its peculiarities are summed up by its author as follows: "The more elongate form, the short strongly widening middle and hind tibiae, the spinous hind trochanters, the elytra without striae, and the strongly reflexed or rather strongly thickened apical margin of the clypeus will readily distinguish this from any of the described species; it is also remarkable by having one spur of both middle and hind tibiae pectinate."

THE ODONATA OF THE BIOLOGIA CENTRALI-AMERICANA.*

BY RAYMOND C. OSBURN,
NEW YORK CITY.

The final section of this admirable work by Professor P. P. Calvert, of the University of Pennsylvania, made its appearance near the close of 1908, marking the completion of a research extending over nearly a decade for Professor Calvert, after it had been successively undertaken and abandoned by McLachlan, Hagen and Karsch. Dr. Calvert began this work in 1899, and the first section appeared in 1901. The complete work consists of an introduction of 25 pages, dealing chiefly with distribution and sources of material; the body of the work, 325 pages, and a supplement of 68 pages, dealing with additional material received too late to be incorporated in the main part. A very complete index, including all synonymic names, follows. The nine lithographed plates include 404 figures, showing the essential features of all the new, as well as of many hitherto imperfectly known species.

The region covered by this report comprises all the Central American States, with Panama on the south, and Mexico, with the immediately adjoining parts of Texas, New Mexico, Arizona and California, which present the same climatic conditions as northern Mexico, on the north. These limits include a very natural area of distribution for the Odonata, plainly marked off from the West Indies also, as the analysis of the data indicates. The list for this area includes 71 genera, embracing 293 species and varieties, and of this list 18 genera are represented by species found only in this region, and 143 species, almost half the entire number, are not known to occur elsewhere.

A comparison of the dragonfly fauna of this area (to which we may refer briefly as the "central" region) with that of the rest of North America ("northern" region) yields some interesting results. The number of species at present known from the two regions is approximately the same, notwithstanding the much greater area of the northern region, but the number of genera in the central region is considerably in excess of that in the northern. The proportions of the species in the

* A review, read before the N. Y. Ent. Soc. at its meeting on January 5, 1909.

two suborders, Zygoptera 142, Anisoptera 161, are much more nearly equal than in the northern region, where the Anisoptera are in much greater excess.

There are numerous interesting cases of replacement of similar genera when we compare the two faunas. Thus among the Calopteryginae the genus *Heterina* is represented in the central region by 17 species, while not more than 3 occur in the northern region. *Calopteryx*, on the other hand, has 8 northern species, while Calvert's list contains only one. Among the Agrioninæ, the genus *Enallagma*, with more than 20 northern species, has but 5 representatives in the central region, but this defect is more than balanced by the genus *Argia*, which is represented in the central region by 48 species, while but 8 occur in the rest of North America. In the Gomphinæ, the genus *Gomphus*, with some 35 northern species, is not found in the central region, nor are the related genera, *Ophiogomphus*, *Dromogomphus*, *Hagenius* and *Tachopteryx*. However, there do occur *Epigomphus* and *Gomphoides*, not found in the northern region, and *Progomphus* and *Erpetogomphus*, each with a single northern representative. The Corduligasterinæ are scantily represented by two species, and of the Cordulinæ, of which there are about 40 species in the northern region, the only undoubted record is that of a larva (species undeterminable) of a *Macromia* taken in northern Mexico. The Libellulinæ are, however, richly represented, with 28 genera and 97 species, of which number 18 genera and 75 species do not occur in the northern region. Our common northern genera, *Celithemis* (with 6 sp.) and *Leucorrhinia* (6 sp.) have not been found in the central region, and *Sympetrum* (17 sp.) and *Libellula* (20 sp.) are represented respectively by 2 and 8 species in the central region. On the other hand, *Micrathyria* (9 sp.) and *Brechmorhoga* (9 sp.) do not occur in the northern region, and *Erythrodiplax* (15 sp. and var.) is represented scantily in southern United States, while one species (*E. berenice*) ranges coastwise as far as Massachusetts.

Naturally, Calvert has found it necessary to do a great deal of revising in connection with this work, yet with commendable conservatism, he has chosen to give us but two genera, *Hesperagrion* and *Metaleptobasis*, both belonging to the Agrioninæ and neither of them including any northern species. It was to be expected that many new species would appear in a region so little studied previously, but one is scarcely prepared to meet with such a number, 81, until he

considers the enormous amount of material from this region, nearly 11,000 specimens, which has been in Dr. Calvert's hands. As we should expect, these new species occur most frequently among the smaller Zygoptera, the genus *Argia* containing the surprisingly large number 22 (as against 26 species previously known). The presence of such an array of the smaller, more inconspicuous species is due not only to the very careful analysis of the material, but it is in a good measure traceable to the recent collecting trips of a number of experienced odonatologists (besides Calvert himself) into this region. The collections and notes made by these gentlemen, fully accredited in the work, have added largely in many ways to the value of the paper.

This work of Calvert's stands alone in American odonatology. The only paper of sufficient scope to be in any way comparable is Hagen's Synopsis of N. A. Neuroptera (1861) and that was pioneer work. But for that matter there are few works in the whole field of systematic entomology which can be compared with this when we consider the amount of material studied as well as the thoroughness, care and painstaking effort with which all the details of the material have been searched and weighed. It is a model of modern systematic entomology and the reviewer heartily recommends to all students of systematics a careful consideration of the methods employed by Calvert in the pursuit of this work.* The elimination of "snap" judgment, and even to a great degree, of the personal equation, by long series of measurements in the study of genera, species and variations, may not appeal strongly to some entomologists, but it is scientific and assures a safe basis for permanence of results.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF OCTOBER 6, 1908.

Held at the American Museum of Natural History, President C. W. Leng presiding, with eleven members and three visitors present.

The librarian, Mr. Schaeffer, reported the receipt of the following exchanges since May, 1908.

Bull. 46 and 48, University of Montana.

Mittheil. a. d. Zool. Mus. in Berlin, III, No. 4; IV, No. 1.

The Polymorphism of Ants, by W. M. Wheeler.

* See "Science," Nov. 13, 1908, for Calvert's own account of his methods.

Honey Ants with a Revision of the American Myrmecocysti, by W. M. Wheeler.
Vestigial Instincts in Insects and Other Animals, by W. M. Wheeler.
The Ants of Texas, New Mexico and Arizona, by W. M. Wheeler.
The Ants of Casco Bay, Maine, with Observations on Two Races of *Formica sanguinea* Latr., by W. M. Wheeler.

Berliner Ent. Zeitschr., LII, Nos. 3 and 4; LIII, No. 1.

Zeitschr. f. Wiss. Ins. Biol., III, Nos. 1-7; IV, Nos. 4-7.

Insect World, XII, Nos. 4-6.

Canadian Ent., XL, Nos. 6-10.

Wiener Ent. Zeitg., XXVII, Nos. 6-8.

Deutsche Ent. Zeitschr., 1908, Nos. 3 and 4.

Horæ Soc. Ross. XXXVIII, No. 3.

Proc. Am. Acad. Arts and Sci., XLIII, Nos. 18-22.

Verhandl. d. K. K. Zool. Bot. Gesel. Wien, LVIII, Nos. 4 and 5.

Proc. Amer. Philos. Soc., XLVII, No. 188.

Bull. de la Soc. Ent. d'Egypt, 1908, No. 1.

Bull. Buffalo Soc. Nat. Hist., IX, No. 1.

Chicago Acad. Sci. Special Publ., No. 2, 1908.

Bull. de Lab. de Zool. Gen. Agraria, Vol. II.

Revue Russe d'Entomologie, VII, Nos. 1, 2 and 3.

Bericht über d. Zool. Mus. Berlin, 1908.

Bull. della Soc. Ent. Italiana, XXXVIII, Nos. 3 and 4.

Stett. Ent. Zeitg., LXIX, No. 12.

Brooklyn Inst. Mus. Sci. Bull., I, No. 14.

Mr. Davis proposed as active members of the society: Roy W. Miner, American Museum of Natural History; Charles L. Pollard, New Brighton, N. Y.; Charles E. Sleight, Paterson, N. J.; for Prof. Wheeler Mr. Davis also proposed Dr. Alex. Petrunkevitch, Short Hills, N. J.

On motion of Mr. Schaeffer the by-laws were suspended and the secretary empowered to cast a single ballot for the election of the proposed members.

Mr. Davis spoke of the trip of Alanson Skinner to the Hudson Bay Wilds, and read an account of the expedition from the New York Tribune of Sept. 14. Mr. Skinner brought back with him a number of insects, mostly Coleoptera collected at James Bay, and presented to Mr. Davis. These were exhibited. Among the specimens shown were *Cicindela hyperborea*, *Cicindela 12-guttata*, *Carabus mæander*, *Bembidium carinula*, *Silpha lapponica*, *Hippodamia fulcigera*, *Coccinella transversoguttata*, *Adetocera brevicornis*, *Criocephalus agrestis*, *Neoclytus muricatus*, *Acmæops proteus*, *Tetropium cinnamopterum*, *Corymbites appressus* and *Adoxus vitus*. Such widely distributed species as *Aphodius fimetarius*, *Monohammus scutellatus* and *Diatrocta 12-punctata* were also represented in the collections.

The president called upon all of those present to give an account of their summer's collecting experience.

Mr. Southwick spoke of his arduous work in fighting insects in Central Park during the past summer.

Dr. Dow spoke concerning the excellency of the collecting at Clairmont, New Hampshire.

Dr. Zabriskie told of his trip through the Great Lakes where his collecting was incidental.

Mr. Barber spoke of his collecting experience in the Adirondack Mountains.

Mr. Harris, Mr. Dickerson, Mr. Schaeffer spoke briefly of their summer's work.

Dr. Younglove, of Elizabeth, N. J., spoke for a few minutes chiefly concerning instinct in insects.

Society adjourned.

MEETING OF OCTOBER 20, 1908.

Held at the American Museum of Natural History, President C. W. Leng in the chair, with fifteen members present.

The minutes of the two preceding meetings were read and approved.

The librarian reported the receipt of the following exchanges :

Deutsche Ent. Zeitg., 1908, No. 6.

Tijdschrift voor Entomologie, 1908, No. 2.

Proc. Amer. Philos. Soc., XLVII, No. 189.

Mr. John W. Angell, 235 West 76th St., was proposed as an active member of the society by Mr. G. W. Angell.

On motion of Dr. Zabriskie the by-laws were suspended and the secretary instructed to cast a single ballot for the election of Mr. Angell.

The president spoke of Professor Smith's fiftieth birthday and announced that at its celebration it was the intention of entomological friends to present a loving cup and requested that all so inclined contribute to raise the necessary funds.

Mr. G. W. Angell moved that the president appoint a committee of one to receive the contributions. Carried. The president appointed Mr. Dow.

On motion of Mr. Schaeffer a hearty vote of thanks was tendered to Mr. Miner for his efforts in securing to the society a suitable meeting room in the Museum building.

Mr. J. R. de la Torre Bueno spoke concerning the life histories of some of the aquatic Hemiptera. He spoke briefly concerning the egg-laying habits and development of the following forms : *Belostoma fluminea*, *Ranatra 4-dentata*, *Microvelia borealis*, *Gerris remiges*, *G. marginatus*, *G. canicularis*, *Tropobates pictus*, *Mesovelia bisignata*, *Hydrometra lineata*. All of these species, with most of their developmental stages, were exhibited.

Rev. J. L. Zabriskie spoke concerning the gall-making dipteron *Eurosta solidaginis* Fitch. He called attention to the definition of "ptilinum" in Williston's "North American Diptera," 3d ed., p. 22, which is as follows: "In the Cyclorrhapha an inflatable organ capable of being thrust out through the frontal suture just above the root of the antennæ, and which is used by the imago in springing off the cap to the puparium when about to extricate itself." Words to the same effect are found in Dr. Smith's "Glossary of Entomology." Professor David Sharp gives a more extended explanation in the Cambridge Natural History, Vol. VI, p. 422. Early in the year 1878 Dr. Zabriskie was rearing some flies of this species from their galls on *Solidago canadensis* L., and had the opportunity of observing several imagines in the act of issuing, each from its own gall. Doubtless, as is usually the case, the larva when full-fed had bored a tunnel from its central cell straight to the outer surface of the gall leaving only the thin cuticle undisturbed to act as a sealed door over its refuge, and then returned to the cell for its long rest in its forming puparium. In the house during the early spring, the imagines began to issue. They had evidently

thrown off the round cap of the puparium and had proceeded along the tunnel to the door. This is what was observed in the several instances of the actual escape from the gall; the door was suddenly ruptured and thrust aside, and presently there appeared at the opening a moist, contorted, globular mass which slowly oozed through, followed by the head of the fly, and in a short time, by its entire body. This soft mass was the ptilinum, situated on the front, nearly as large as the head itself, giving the insect a very grotesque appearance. If the fly was undisturbed this was rapidly contracted, and soon entirely disappeared into the head through the suture just above the base of the antennæ. After observing this action, probably in three instances, when the next opportunity occurred, as soon as the fly was free, Dr. Zabriskie dropped it into a cyanide bottle. The killing was quite rapid but not completed before about two thirds of the ptilinum had been retracted into the head. This identical specimen was exhibited, with the ptilinum still further reduced in size by drying during its long stay in the cabinet. The gall of this species, together with two specimens of the fly, were also exhibited.

Mr. Carl Schaeffer exhibited a collection of nearly a hundred species of Alaskan beetles collected and sent to him by his brother. He remarked that only two or three of the species were rare, and spoke concerning the distribution of a few of the species.

Mr. George W. Angell exhibited specimens of *Lachnostenra cibrosa* from Mexico, sent to him by Mr. Schaupp, and a new species of *Tyndaris* from Key West, Florida. Society adjourned.

MEETING OF NOVEMBER 3, 1908.

Held at the American Museum of Natural History at 8.15 P. M., President C. W. Leng in the chair, with six members and one visitor present. The minutes of the preceding meeting were read and approved.

Mr. Barber proposed as an active member Mr. Christian E. Olsen, 1 Jefferson Ave., Maspeth, L. I. On motion of Mr. Davis the by-laws were suspended and the secretary instructed to cast a single ballot for the election of Mr. Olsen.

Mr. Leng exhibited specimens of *Griburius scutellaris*, *decoratus*, *larvatus*, *montezuma* and *lecontei*. He quoted descriptions by Suffrian and other authors showing that *decoratus* should be added to our lists. In regard to *G. equestris* Oliv. he remarked that no exact locality is given by Olivier or by Suffrian; that no insect from America corresponds to the description, and that it possibly is not from this country.

As Mr. Schaeffer was absent his paper was postponed till the next meeting.

Mr. William T. Davis exhibited a collection of ten specimens of *Xiphidium* from the eastern United States, four of which are to be found in the vicinity of New York city. He called particular attention to a series *V. strictum* collected by himself and Mr. L. B. Woodruff at Arrocar, Staten Island. Most of the females found had wing pads only; a few had long tegmina and wings extending beyond the hind femora; but two or three examples showed wings and tegmina of intermediate length. The ovipositor, which is very long in this species, also shows some variation in amount of curvature.

Mr. H. G. Barber exhibited a collection of Hemiptera taken during the past summer in the vicinity of Cascade Lakes, Adirondack Mountains. He remarked

that none of the species had been collected at any great altitude, and for the most part were not unlike what might be collected about New York city. Most of them were collected by sweeping.

Mr. Dow spoke of capturing a number of specimens of *Malachius aeneus* at Claremont, N. H., on May 30 resting on *Spiraea*, and other specimens were taken during the latter part of June on other plants.

MEETING OF NOVEMBER 17, 1908.

Held at the American Museum of Natural History, President C. W. Leng in the chair, with sixteen members and one visitor present. The minutes of the preceding meeting were read and approved.

Mr. Dow reported on the dinner to be given to Professor J. B. Smith, Saturday, the twenty-first inst.

Mr. Matausch exhibited a new color variety of *Smilia camelus* from the Catskill Mountains, and read a description of the variety.

Mr. Schaeffer exhibited and spoke on some new Rhynchophora, the descriptions of which were prepared for the December number of the JOURNAL. He also showed several new species of Coleoptera from Nogales, Arizona, among which were 2 *Chauliognathus*, 2 *Discoderus*, 1 *Chrysobothrus*, 1 *Onthophagus*, 1 *Hydnocera* and 1 *Bruchus*.

Mr. Engelhardt exhibited five species and two nests of stingless bees from Guatemala, concerning which he made the following remarks: "The so-called stingless bees were among the most abundant of insects observed during the past summer in Guatemala. Their nests were found on numerous occasions in hollow trees, about houses and underground, but never in exposed situations. Each colony contained an immense number of individuals. The nests of those above ground, so far as noted, were all built of wax, while those underground were built of clay or earth intermixed with a gummy substance. In the character of construction all were alike, the central breeding combs being encased by a mass of irregular galleries with the round honey pots placed on the outside. The honey though sweet was found to be inferior in flavor to that of the hive bee. The Indians are said to eat it, but the white people prefer that of the hive bee which has been successfully introduced. Some of the bees, especially those that build clay nests under ground, displayed a fierce disposition on being disturbed, attacking, seemingly with preference, eyes, ears and nose of the disturber, and even crawling under the clothing. They acted as if about to sting, curling the abdomen around, and the dull pressure of it could be distinctly felt. But most annoying of all was the bite of their sharp mandibles."

Mr. Beutennüller exhibited the nest of a stingless bee from Brazil, which had been made by a colony of live bees in the Museum.

Mr. Schaeffer spoke briefly of the honey-making wasps of Brownsville, Texas.

Dr. Pollard mentioned the recent death of Dr. James Fletcher, of the Central Experiment Farm, Ottawa, Ontario.

Society adjourned.

MEETING OF DECEMBER 1, 1908.

Held at the American Museum of Natural History, President C. W. Leng in the chair, with sixteen members present. The minutes of the preceding meeting were read and approved.

Mr. Dow, of the committee that arranged the dinner in honor of the fiftieth birthday of Professor J. B. Smith, reported that the occasion had been most successfully celebrated. The report was accepted and the committee was discharged.

The librarian, Mr. Schaeffer, reported the receipt of the following exchanges:

Mittheil. d. Schweiz. Ent. Gesel., XI, No. 8.

Anales del Museo Nac. de Buenos Aires, IX, Ser. 3, 1908.

Verhandl. d. K. K. Zool. Bot. Gesel. Wien, LVIII, Nos. 6 and 7.

Verhandl. Soc. Imper. d. Naturalistes de Moscow, Nos. 1-3, 1907.

Canadian Ent., XL, No. 11.

Insect World, XII, Nos. 9 and 10.

New Species of Noctuidæ for 1908—I, Notes on the species of *Phæocyma*.
Notes on the species of *Rhynchagrotis*, by J. B. Smith.

Trans. Texas Academy of Sciences for 1907.

Proceed. Calif. Acad. Sciences, 4th series, III, pp. 1-40.

Zeitschr. f. Wissenschaft. Insektenbiologie, IV, Nos. 8 and 9.

Proc. Amer. Acad. Arts and Sciences, XLIV, Nos. 1-5.

Mr. Beutenmüller read a paper on the North American species of *Amphibolips* and *Holcaspis* illustrated by pen and ink drawings and blackboard sketches. He stated that the galls and adults of these two genera comprise the largest known species of Cynipidæ, and that their galls are very characteristic. The galls of the genus *Amphibolips* may be divided into three groups as follows: (1) those with a spongy substance internally (*A. confusa*, *longicornis*, *carolinensis*, *spinosa* and *acuminata*); (2) those with radiating fibers internally (*A. inanis*, *ilicifolia*, *cinerea*, *cælebs*, *citriformis*, *melanocera*, *cooki* and *tinctoria*); (3) those with a uniform pithy, compact substance internally (*A. prunus*, *gainesi*, *fuliginosa*, *palmeri* and *trizonata*). The galls of *Holcaspis* may be divided into two groups, (1) those with a more or less free, central, larval cell (*H. globulus*, *omnivora*, *rubens*, *cinerosa*, *divaricaria*, *bassetti*, *truckensis*, *sileri*, *spongiosa*, *ficigera*, *succinipes*, *perniciosa* and *corallinus*); (2) those with radiating fibers (*H. centricola*, *maculipennis* and *brevipennata*). He also spoke on the subject of galls in general from the botanical and entomological standpoints, and stated that they are of considerable scientific importance in so far as their morphological structure and origin are concerned. The origin and development of insect galls, more especially on the oak, is a subject which has puzzled many eminent scientists. It was first supposed by various naturalists that the Cynipids deposit simultaneously with the egg a drop of irritating fluid which causes the sap to flow and that the formation of the gall is the result of chemical action. The two important factors, however, at work in connection with gall formation, are the activity of the vegetable sap and the influence of the animal agency. Botanically considered galls cannot arise except when the living insect is in direct contact with the living cells which exist in plants and are specially set apart for their growth and development, and in order fully to understand the formation of gall structure recourse must be had to section cutting as well as minute microscopical investigation. It has been shown that the effect on the vegetable structure of the wound made by egg-laying does not cause the gall, as that heals up and no gall formation begins till the larva is about to escape from the egg. Adler discovered that as the larva grew and fed, the gall increased in size, from which it may be inferred that galls (oak-galls) are the result of the excitatory action of the larva in conjunction with the vitality of the vegetable cells.

In consideration of the great variety of galls and the comparative sameness of larval anatomy, it is difficult to understand what are the factors which produce variation of structure, size and color of galls that occur on the same parts of the different plants or different parts of the same plant.

Mr. Harris exhibited a collection of about 200 specimens of *Cicindela formosa-generosa* and made some remarks regarding the possible derivation of the species and its dispersal in the United States and northward. The *formosa* form, which is apparently a development from the older *generosa*, occupies the ground roughly described as lying between the Missouri River and the Rocky Mountains, or westward, specimens in the collection appearing from Idaho, and as far south as Texas. *Generosa* is reported from most of the states north of about 35° latitude. In this section it is abundant in the pine-belt of New Jersey, more sparingly at the western end of Long Island. It is also found in abundance on the Connecticut River flats near Windsor, on high sand hills in Litchfield Co. in the same state, and on similar ground in Saratoga Co., N. Y., on the divide between the Hudson River basin and Lake George, and in the valley of the Bouquet River west of Lake Champlain. Everywhere there is practically no variation in the markings, but a great difference in size and color. In the Dominion of Canada a most interesting development has taken place, described by Mr. Leng as var. *manitoba*. The white markings are much broadened, in extreme cases being nearly confluent. In sharp contrast to this form, specimens from New Jersey were shown in which the middle band is interrupted, and the other markings much abbreviated. Beautiful specimens of intergrades between *generosa* and *formosa* were shown from Kansas and Iowa, illustrating the close relation between the two forms of the species.

Mr. William T. Davis exhibited a living specimen of *Mezium*, which showed rows of stiff bristles on the elytra. These bristles fall off when the insect is dead and roughly handled, and lead to the insect being sometimes described as having smooth elytra. *Mezium* and *Gibbium* both occur in the tower of the New York Produce Exchange. *Mezium* has been found in April and November, and *Gibbium*, which is more common, in March, April, June, July and September.

Mr. Davis also exhibited a living larva of the 17-year cicada of the 1911 brood on Staten Island.

Mr. Engelhardt exhibited two boxes of Coleoptera collected in Guatemala on his recent visit there. He spoke concerning the difficulties under which collecting was carried on, and explained that such material as he gathered was collected rather incidentally.

Society adjourned.

MEETING OF DECEMBER 15, 1908.

Held at the American Museum of Natural History, President C. W. Leng in the chair, with sixteen members present.

Mr. Roberts, delegate to the Council of the New York Academy of Sciences, reported that Professor J. B. Smith had brought up the matter of a proposed lecture by Professor E. B. Poulton, of England, to be given under the auspices of the New York and Brooklyn Entomological Societies, and received the endorsement of the Council.

The president appointed the following committee to nominate officers for the coming year: Messrs. E. B. Southwick, J. L. Zabriskie and E. G. Love.

Rev. J. L. Zabriskie gave an account of his microscopical examination of the wax from nests of stingless bees, *Trigona* sp. from Olas de Moka, Guatemala, and *Melipona fuscipes* Friese, from the Orinoco River, Venezuela, and a comparison of the same with wax produced by other hive bees. He found no microscopical fibrous structure in the wax itself, but considerable foreign matter, such as vegetable fibers, pollen grains, etc., lodged there accidentally or brushed off from the bees' bodies. He exhibited several slides of this material and explained how he had prepared the wax and mounted the specimens for examination and preservation.

Mr. I. Matausch exhibited a number of species of interesting *Membracidae*, together with some colored drawings of the species, and read a short diagnosis of some of the species.

Mr. William Beutenmüller exhibited a fine collection of Siberian butterflies which had recently been presented to the Museum. These butterflies, from Sredne Kolymsk, Province Yakutsk, collected during June and July by Dr. J. Strojetzky, and determined by N. J. Kusnezov, of St. Petersburg, Russia, comprised the following species: *Colias palæno* var. *orientalis*, *hyperborea*, *viliensis*, *melinos*, *Melitaea iduna*, *aurelia*, var., *Argynnis freyi*, *frigga*, *angarensis*, *aphirape* var. *assianus*, *Pieris napi*, *callidice*, *Euchloe orientalis* var. *infumata* (type), *Canonympha tiphon* var. *viliensis*, *Lycena optilete* var. *cyparissus*, *Pamphila palæno*, *Graptia c-album*, *Papilio machaon*, *Parnassius tenebrioides*, *Erebia discoidalis*, *fasciata* var. *semo*, *dabanensis*, *Triphysa tsckerkii*, *Oneis jutta*, *bore* var. *parsa* form *acteloides*, and form *arethusoides*.

Mr. G. P. Engelhardt exhibited a small collection of Hemiptera collected in Guatemala on his recent visit there and spoke briefly concerning some of the species.

Mr. H. G. Barber exhibited some live specimens of a new *Bacchus* which had been given to him by Professor E. B. Wilson, who had received them from Mr. Manee of Southern Pines, North Carolina.

The president appointed Messrs. G. W. Angell and Dr. Love as a committee to report on the possibility of the society's coöperation in publishing Mr. Henshaw's Bibliographical List of the Coleoptera of North America.

Society adjourned.

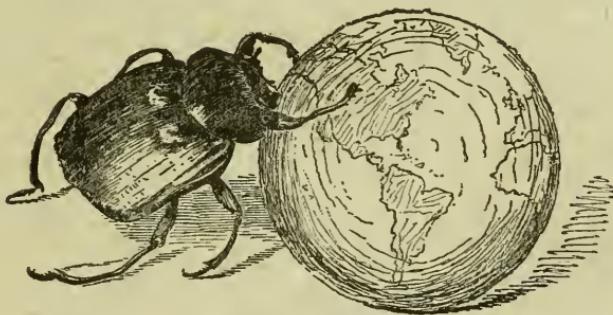
H. G. BARBER,
Secretary.

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E. G. LOVE.

W. M. WHEELER.

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OWL PELLETS AND INSECTS.

BY WILLIAM T. DAVIS,
NEW BRIGHTON, N. Y.

If the persevering naturalist desires to know what small mammals inhabit the region in which he is interested, and much else about other wild creatures, we would recommend that he inquire of the resident barred owl, if any such there be. That fluffy individual sits all day on his perch, most likely in some secluded grove of cedars, and though he may close his eyes, he keeps his ears wide open, and you will probably not see him if you call. What you will find under his roost will be masses of hair, bones and the remains of various small animals of which he has eaten, and then thrown up as pellets of undigested material. He not only catches birds, including other owls, but also snakes, fish, frogs and insects; but it is his gastronomic entomology of which we will here make record.

On March 31, 1907, I was fortunate in finding under the roost of one of these owls on Staten Island, a large pellet three inches long by one inch in diameter. It consisted largely of the bones of frogs, a goodly number of feathers from a small bird, and very plainly the remains of several water beetles. Upon carefully taking the pellet apart, it was discovered that the owl had captured four female *Dytiscus fasciventris*, as shown by the grooved elytra, and also what appeared to be a male of the same species. There was in addition the remains of two *Hydrocharis obtusatus*.

In some pellets which Mr. Waldron De W. Miller, of the American Museum of Natural History, found under the roost of a barred owl near Plainfield, N. J., we discovered the remains of four *Dytiscus*

verticalis, three *Dytiscus fasciventris* and two *Hydrocharis obtusatus*. While the heads of these water beetles, when found in the pellets, are usually whole, yet the owl breaks them occasionally, but the head and nearly round coxae are well preserved and are among the most conspicuous objects when the mass is broken open. One can usually "prove" the contents of a pellet by checking off the number of heads against the wing-covers.

I am also indebted to Mr. James Chapin for a number of barred owl pellets from Staten Island in which we have found the remains of insects. In one there were five *Dytiscus verticalis*, some of the heads being snipped in two; in another a *Dytiscus fasciventris* (?); in another a *Dytiscus verticalis*, and in still another, one female *Dytiscus fasciventris* and one *Carabus limbatus*.

We have also found the remains of some grasshoppers in barred owl pellets.

It will be noticed that all of the water beetles here mentioned are large insects, and it may be, we think, correctly argued from this that the owl is unable to catch in his talons any of the more numerous small species, since his claws are not adapted to picking up little things.

There seem to be numerous records that some species of owls go fishing, and we have had ample proof on Staten Island that the barred owl eats catfish, many frogs and what large water beetles he can catch.

Insect remains have been found in the pellets of the barn owl and in those of the long-eared owl, but not so often, and next to the barred owl the one that eats the greatest number of insects appears to be the little screech owl. We have sometimes found this bird near the electric lights out in the country, where perhaps, like the bats and toads, it was attracted by the great number of insects. On one occasion we found a number of frogs arranged on the top rail of a fence near a swamp. They were found torn open, disclosing that each had swallowed a number of May beetles. So an owl when he swallows a frog may get some beetles at second hand. Mr. Miller has, however, found some screech owl pellets that were largely composed of May beetle remains, and the insects had evidently been captured by the birds. The remains of three specimens of *Cychrus lecontei* have also been identified from what appeared to be screech owl pellets, collected by Mr. Miller.

In the economy of nature the pellets of hair, bones, feathers, etc.,

that are thrown away by the owls are much appreciated by the species of *Trox*, which find therein just the food to their liking. *Trox erinaceus* is most commonly found in the pellets on Staten Island, Mr. Chapin and I having secured forty-nine specimens ranging in date from February 25 to May 10. A single *Trox scaber* was collected in a pellet on May 16. Unless one is on the lookout these little beetles easily escape notice when the pellets are collected, for usually they are to be found beneath them and lie for some time motionless on the ground.

At the meeting of the New York Entomological Society, held May 19, 1903, Rev. J. L. Zabriskie exhibited the snipped-off butt ends of hairs taken from the stomach of *Trox unistriatus* collected some years before about a dead horse. The hairs were placed under a microscope, and all were found to have been cut off in the same oblique manner.

ON THE ORIGIN OF ENTOMOLOGICAL NAMES.

By ROBERT PERCY Dow, B.A.,

NEW YORK CITY.

When Linné began his work of classifying all nature his primary source of information was the existing classification made by Aristotle. In the middle of the eighteenth century almost all so-called learning was classical. The new school of science had awakened in Europe in mathematics and mechanics, but the great chemical awakening was to come half a century later and the development of knowledge of electricity came a few years later still. Linné's first effort was to identify all plants and animals mentioned in classic authors and to apply these names correctly in his new system. There is ample evidence that he made many gross blunders of translation, but there is no indisputable evidence that he altered or suppressed any existing classic names. Following him, the students of entomology plunged eagerly into the task of identifying Aristotelian species. Years later there was a revival of this line of study especially in Germany, but of late it has been neglected. A partial list of the important works on the origin of entomological terms is appended to this article. There does not seem, however, to be any bibliography on the subject of the derivation of names of insects mentioned in classic authors, their true meaning and

the reasons for their application. There is no attempt to examine into any of these names to ascertain whether they have not an inherent meaning that might aid in identification. At all events, such an examination would prove to be a pleasant side line of study. Dr. Gemminger (Gemminger and Harold, Catalogus Coleopterum) has given remarkably complete analyses of names invented by Linné and all his successors, but concerning the earlier names he merely states the fact that they are the classic names of the insects in question. On the other hand, the lexicographers have applied their best efforts in comparative philology but have been handicapped by gross ignorance of entomology.

It is a remarkable fact that the Greeks, who, as early as pre-Homeric times, possessed a knowledge of the transformation from larva to chrysalis and from chrysalis to imago, should have had but one name for butterfly. Large, small, green, black, white or yellow—all were *psyche*, *i. e.*, emblematic of the resurrection. They made a distinction between butterfly and moth, the latter being called *phalæna*. This word, which does not occur in Aristotle, is really applied to the larva and not to the imago. For the root, compare *phalangis* and *phalanx*. The earliest application of the word was to a monster that arose from the sea and devastated provinces. The primitive mind was prone to exaggeration. In Italian it became *balena*. When ancient scholars sought the animal represented by this word, the only one existing was the whale, and they jumped at a conclusion. The same error occurred in Hebrew in an effort to transcribe intelligently the adventures of Jonah. The whale has not oesophagus enough to swallow a small piece of a man. The real *phalæna* was an imperfect prehistoric recollection of an octopus, long extinct in the Mediterranean, but which some time caught and killed many men in its expansive arms. Compare *phalanges*, *i. e.*, the first ten fingers of the same general shape, which acting in common are effectual. The *phalanx* is a body of men similarly armed and acting in unison, thereby becoming more effectual than the same number of men acting separately. The *phalæna* of classic times is a band of caterpillars which devastate a field, while the same number of scattered caterpillars could do no appreciable harm. The name, then, properly applies to the cutworms, or the Noctuidæ. It was applied by Linné to moths generally. Walker adopted this conception, but Packard tried to confine it to certain Geometrididæ. All of these authors made mistranslations.

The Roman word for butterfly is *papilio* — a Sanskrit root. The lexicographers were wrong in comparing it with *pavilio*. The root is “pal,” to stroke. This was duplicated like a host of other roots. Its nearest analogue is *palpare*. Compare the entomological term “*palpi*,” the organs with which an insect strokes its food into the maxillæ, and again into its labial attachments. The substantive ending is common. Compare *pipio*, the chirping sparrow; *tenebrio*, literally the doer of deeds in the dark, hence the trickster; *stellio*, the newt, the name coming from the stellar shape of the five toes of each foot.

In prehistoric times men were too busy in the struggle for existence to notice useless insects. They named only those which bit or stung or furnished food. It was left for the children at play to observe and name the rest. They saw the creature flying slowly with palpitating wing-motion clearly discernible. They also saw the butterfly alight and stroke its wings before becoming motionless. Virgil and the poets use the word *papilio* as meaning the dash of color flitting by in the sunlight and adding a charm to the landscape.

We may also best consider at this juncture some of the onomatopoetic names applied by children and subsequently incorporated into the language. *Gryllus* ($\gamma\tau\tau\lambda\lambda\sigma$) is their attempt to imitate the stridulation of the common cricket. *Cicada*, the harvest fly, if pronounced with a soft *ch* sound, as it undoubtedly was, has an obvious origin. The Greek $\tau\acute{\epsilon}\tau\tau\acute{\epsilon}$ sounds like a stick drawn along a picket fence. It describes the European equivalent to *Cicada tibicen* to a nicety. Homer says orators should copy this sweet sound. It offended Virgil’s ears most horribly. Homer would be a pleasanter companion on a collecting trip than Virgil. He had a better disposition in adversity. Note also the poetry of Latreille — *tibicen*, the flute player.

Curculio, the grain weevil, occurs once only in Plautus. The duplication and termination are the same as in *papilio*. Compare *curvus*, Latin, curve, English, *couluber*, the Latin for snake. The *Curculio* is the insect which as a larva is footless and makes a circle of itself in its home. As an adult its head and body make a pronounced curve.

A large number of Greek names, similar in form, have so far defied analysis, for example, *cimex*, *sphex*, *culex*, *pulex*, *sirex*, etc. It might be thought that since these creatures are all biters or stingers the suffix *ex* had some meaning of the sort. This theory is unten-

able. The ending occurs in a host of other words and is a contraction. *Myrmex*, the ant, is *μυρτίς* (10,000) plus *ex*. It was once *muriamike* (feminine). In Latin it became by natural transition *formica*. To the Greek mind the ant was that insect which lives in large colonies. To them, primitively, all hosts too numerous to count were "*myria*." As a theory I would suggest that *ex* is quite like the Latin — *io*, meaning "that which." The philologist must pursue the verb roots, *cim*, *sph*, *cul*, etc.

Inasmuch as the word *sphex* is equivalent to the Latin *vespa*, German *Wespe*, English *wasp*, with equivalents in other languages of Indo-European origin, it is evident that the name was applied before the great emigrations. In Greek it occurs in Herodotus. *Apis* was applied *before* the emigration to Greece and Italy, but *after* the Northern emigration. The English word *bee*, like *buzz*, is purely onomatopoeic. The word *formica* is coeval with *apis*. The English "ant" is a contraction of *emmet*. The English "beetle" is the "little biter." The children named these as most others. They merely supposed that the creature bit. The primitive men had no time to investigate. They felt the sting of the *sphex* hundreds of generations before they discovered the beneficence of the honey-bee.

Most of the other names occurring in classic literature can only be considered separately. *Buprestis* is from Hippocrates, meaning an insect which when eaten by cows caused swelling and generally death. Here is an obvious mistranslation by Linné. Cows cannot reach this woodborer. Possibly Hippocrates had an imperfect knowledge of the dipterous creature which develops from the egg laid on the fetlock and after being licked into the mouth passes first into the stomach and thence through the tissues to the surface.

Carabus (Aristotle) has no connection with the Egyptian word rendered in Greek *scarabæus*. The similarity in sound apparently deceived the lexicographers and the unobservant Greek as well. The curved mandibles of the Carabid marked it to the children's mind as differing from the branching mandibles of the stag-horn beetle. Linnaeus translated correctly. The Latin for stag-horn is unmistakably the *Lucanus*, as described in Pliny. The painstaking scholar who noted sadly that the *Lucanus cervus* is not as common in Lucania as elsewhere, should read the joke book. The predecessor of Pliny had his fling at the rural Lucanian tribe, whether the term applied to the big arms, lumbering gait, hooked noses or prognathous jaws.

Greek literature has plenty of examples of similar jests directed against the boorish Boeotians.

Fabricius was responsible for an odd translation of *Cossus*, Latin, meaning a wood-boring larva good to eat. The lexicographer refers this to a *Prionus*. It is much more likely that it refers to some scarabæid larva which lives in rotten wood and makes its cocoon of chips. Such larvæ are not only eatable but very tasty. German boys are fond of the adult *Melolontha* to this day. The head is removed and the abdominal contents sucked out. The first taste is sweetish, the last is slightly bitter.

Ephemeron (Aristotle) is self explanatory. *Melolontha* is the pollen feeder in adult form. The Chrysomelid is merely a beetle of a distinct golden color, perhaps a Scarabæid, perhaps a *Coptocycla*. Linné mistranslated *Attelabus* of Aristotle. The context indicates that it is a wingless creature with large eyes, a locust or some allied insect. *Thrips* is, by the context, a wood-borer. *Dermestes*, the skin-eater, is Homeric. It can only apply to the Dermestidæ, or possibly a *Trox*. *Ips* is Homeric and was mistranslated by Fabricius a Nitidulid, and by De Geer as a Rhynchophorous insect. It is a larva which eats horn and wood, quite possibly a Ptinid. The Latin *Musca* does not admit of mistranslation.

Staphylinus was a misconception on the part of Aristotle and a mis-translation on the part of Linné. Literally it is an insect which smells like the bruised wild carrot, and is one of the Coleoptera, as Aristotle understood that order. Hemiptera were unknown to him.

The *cimex*, the only Hemipteron named, is wingless. The Homoptera he relegated to the locust group. The Coleoptera to him were the insects whose backs were covered by a sheath, no matter whether the elytra met in a straight line down the back or crossed. It is to be doubted whether he would have recognized the Staphylinidæ and Pselaphidæ, with their short elytra, as beetles at all. I believe, therefore, that *Staphylinus* refers to a strong-smelling Hemipteron, probably a pentatomid. So also *Spondyla*, a strong-smelling insect keeping close to the roots of plants, is probably a Hemipteron of some sort.

Clerus (Aristotle) is a coleopterous insect noxious to bees. On this slender evidence the learned Camus argued through many dreary pages that it must be the insect now known as *Clerus apivorus*. The pros and cons of excited and angry German scholars over this point filled volumes from 1832 to 1849.

Acarus is well-named, the mite, that insect which is so small that it cannot be cut in two or further divided. To the children who named it, it was the smallest of living creatures.

Blatta is the insect best characterized by the adjective *lucifuga*. It is in Virgil the exact opposite of the sun-loving *papilio*. Linné applied it correctly, although there are a host of other insects to which it would apply just as well. To the child mind of Italy, if not of earlier peoples, it meant any creepy, crawly insect which beset folks when out in the woods or fields at night.

The *Syrpha* of Homer was a small biting fly or gnat. Linné either mistranslated or misunderstood the habits of the Syrphidæ. *Lamphyrus* could not possibly be mistranslated. It is doubtful whether *Silpha* was a beetle at all. It is unlikely that *Bruchus* was a beetle.

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NEW SPECIES OF NOCTUIDÆ FOR 1909.

BY JOHN B. SMITH, ScD.,

NEW BRUNSWICK, N. J.

Feralia furtiva, new species.

Ground color dark smoky brown; head, thorax and primaries overlaid by mossy greenish yellow. Antennae white at base. Tip of collar and edges of patagia narrowly black, disc of patagia with some white scales. Base marked with black and white. Primaries with all the maculation contrastingly white, edged with black scales. Basal line white, curved to the median vein at base, whence white lines extend along median and submedian to t. a. line. T. a. line white, black-edged each side, strongly outcurved in the interspaces. T. p. line well removed outwardly, white, irregularly edged with black, very irregular in course, outwardly denticulate on the veins, nearest to outer margin on veins 3 and 4. A series of black terminal lunules, beyond which the white fringes are cut with black. Costa marked with alternate black and white areas. Claviform very large, incompletely outlined in white. Orbicular large, almost round, outlined in white. Reniform very large, incompletely defined above and below, sides white. Secondaries uniformly smoky brown, the fringes soiled whitish. Beneath very dark smoky, primaries marked with black and white along costa, and fringes alternately black and white. Secondaries with a blackish discal blotch, from which a blackish line, edged on each side by a whitish shade, extends to base: with a whitish subterminal line, beyond which the wing is paler toward hind angle. Fringes cut with white and smoky.

Expands 1.40 inches = 35 mm.

Habitat. — Sudbury, Ontario, 1891.

A single female which has been in my collection for many years and which I have always hesitated to describe because I feared it might be a discolored *jocosa*. I have recently seen over 100 *jocosa* however, many of them discolored, and have a dozen now before me; but in none is there any approach to the peculiarly uniform dark color of the new species, combined as it is with the strikingly clear white of the maculation. On the under side the marking of the secondaries is quite different, and on the upper side the absence of the usually conspicuous black markings of *jocosa* seem to authorize a new name. At all events I have risked it.

Luperina discors Grote.

This species was described by Mr. Grote from Kansas in 1881, and in 1890 I referred it as identical with Mr. Morrison's *burgessi* described in 1874 from Massachusetts examples. When I wrote I had only western examples before me; but I had seen and had compared eastern examples. From this comparison and the descriptions, I con-

cluded the species identical and so referred them. Since that time *burgessi* Morr., has occurred in some numbers on Long Island, and on comparing these carefully with examples from Nebraska and Colorado, there seems to be no doubt that Mr. Grote was correct in describing his species as distinct. The eastern species has the primaries comparatively shorter and broader, the ordinary spots more completely outlined and relieved, the median space darker, the connecting bar between the lines broad and well developed, the interspaceal black marks preceding and following the s. t. line very obscure. The western form, *discors* Grote, is more strigate in appearance, the primaries have the apex distinctly drawn out, and the interspaceal lines are very conspicuous toward the margin, usually forming sagittate marks before the punctiform s. t. line. While the ground color is the same, the median space does not contrast definitely, and the connection between the median lines is a narrow streak rather than a bar. With only limited material at hand the species look very much alike and are easily regarded as races or varieties: with a series for comparison the differences are so obvious that the wonder is that they could ever have been regarded as the same.

Luperina ona, new species.

Ground color dark umber brown, overlaid by smoky black. Head concolorous. Collar with a narrow black median line tending to become lost. Thoracic disc tending to become umber brown, the patagia with intense black submarginal lines. Primaries almost uniformly smoky black on perfect specimens; but as they become flown the brown base becomes increasingly apparent, until the wing gets a streaked appearance which is best marked beyond the reniform and in general through the s. t. space. A slender black streak below median vein, extending to the t. a. line; but often imperfect in rubbed examples. Basal line black, marked by geminate costal spots and again on median vein. T. a. line black, geminate, more or less interrupted, rather evenly oblique to the angle below the sub-median: then inwardly bent to, and again outcurved below, vein I. T. p. line broken, black, more or less completely geminate, very even on the whole, outcurved over cell, then parallel with outer margin. S. t. line a series of yellowish points set into black interspaceal streaks. Claviform small, pointed, black-margined, a narrow bar extending from its tip to the t. p. line. An interrupted black terminal line; veins marked at ends by yellowish points. Secondaries white, with a blackish narrow outer border which is inwardly diffuse. Beneath white, primaries rather densely, secondaries sparsely black powdered.

Expands, 1.50-1.65 inches = 37-41 mm.

Habitat. — Arizona: Santa Catalina Mts., September; Huachuca Mts., August (Barnes); Minnehaha, Yavapai Co., September (Hutton).

Two males and six females in fair or good condition. The three

examples collected by Mr. Hutson are more flown than those from the Barnes collection and therefore seem lighter in color; but there seems no reasonable doubt of their identity. The orbicular is almost lost in most examples, but can be traced in others by black scales and is then large, oval, oblique. The reniform is very like that in *discors*; large, kidney-shaped, outwardly a little relieved by pale scales-

This is an ally of *discors* but much darker in color and easily distinguished from it.

Fishia hanhami, new species.

Dark smoky brown overlaid by black and blackish. Head with a black frontal line. Collar with a broad black transverse line above a median whitish shade band; a narrow blackish line just below tip. Patagia with black submarginal line. Disc blackish powdered, the divided crest conspicuous. Abdomen more evenly smoky gray-brown, dorsal tufts prominent. Primaries with the markings conspicuous, but not well defined. There is a short black curved mark at base below median vein, and a broader, more obvious streak, which extends to the t. a. line below vein 1. A somewhat diffuse, conspicuous black bar connects the median lines in the submedian interspace. T. a. line geminate, inner line tending to become lost, outer black, included space whitish or at least paler, nearly even from costa to middle, then twice outwardly angled before the inner margin. T. p. line obscurely geminate, inner line black, outwardly edged with whitish, taking the form of a double line opposite the anal angle. In course it is outwardly oblique from costa to vein 6, thence more or less lunulate and parallel with outer margin. S. t. line yellowish white, punctiform except toward apex, the spots interrupting a series of interspaceal black streaks. A yellow, narrow terminal line, preceded by small black interspaceal lunules. Claviform obscured in the diffuse connecting streak. Orbicular large, nearly round, incompletely defined, edged and powdered with small white scales. Reniform large, irregular, a little constricted, incompletely defined, with white powdery edging and markings. Secondaries, in the males, dirty white with a broad, somewhat lunulate black terminal line; in the female uniform dark smoky, with a similar terminal line. Beneath, powdery; all wings with an extra-median line and roundish discal mark: in the male the ground is whitish; in the female smoky.

Expands, 1.56-1.70 inches = 39-42 mm.

Habitat. — Victoria, British Columbia, in September.

Two males and one female, from Dr. Barnes' collection, taken by M. A. W. Hanham, to whom I take pleasure in dedicating this species. It is an ally of *evelina* French, but smaller, darker, much more powdery, and with better marked tufting throughout. The male antennæ are distinctly serrate and fasciculate.

Hyppa spaldingi, new species.

General color gray over a dirty yellowish brown. Head brown, front blackish. Thorax of the general gray, over brown; collar yellowish at base below a black transverse line; patagia with narrow black submarginal lines. Primaries with a washed-out

appearance, none of the maculation complete, all the lines practically lost over the costal region. A distinct short black streak at base in the submedian interspace, extending half way to t. a. line. T. a. line obvious only below median vein, whitish, with edges more or less defined by black scales, strongly curved toward base, outwardly convex. T. p. line also whitish, with very narrow dusky defining lines, outwardly oblique to vein 5 where it forms a distinct angle and runs obliquely inward evenly or with slight sinuations to the inner margin. The median lines are connected in the submedian interspace by a narrow black line over which is a more diffuse brown shading, which obscures the small, pointed claviform. S. t. line whitish, best marked by dark shadings in the terminal space and more obscure preceding marks, irregular in course, making two conspicuous outward dents which reach the outer margin on veins 3 and 4 and extend through the fringes. A series of black terminal lunules. Orbicular very long, narrow and oblique, only partially outlined, best marked anteriorly, most of the outline consisting of a narrow edging of white scales. Reniform rather small, obscure, kidney-shaped. Secondaries very pale smoky yellowish at base, with a broad, rather well defined smoky outer border, a terminal black line and whitish fringes. Beneath whitish gray, with black powdering over a yellowish base; all wings with a black discal spot.

Expands, 1.60 inches = 40 mm.

Habitat. — Stockton, Utah, VI, 30.

A single female in good condition, which I take pleasure in naming after Mr. Tom Spalding, its collector, from whom I have received many interesting and rare species as well as much material in the older forms. The new species is so altogether different from the other described species that comparisons seem unnecessary; and yet the habitus is exactly the same, although it also recalls the yellow winged *Xylophasia lunata* and *inordinata*.

Oncocnemis semicollaris, new species.

Ground color powdery ash-gray. Head inferiorly brown, with black edgings above and below the band. Collar inferiorly, deep blackish brown. Thorax and primaries a very even ash gray, with minute black powderings. All the markings of primaries very fine, black and inconspicuous. Basal line just traceable. T. a. line single, slender, a little excurved, with a small outward angle at the middle, from which an equally slender black streak extends to the t. p. line. The latter is well curved over the cell, then deeply drawn inward to the point where it meets the connecting line, then almost upright to the inner margin. There is no s. t. line and no distinct terminal line. A distinct black streak extends from the end of the cell across the t. p. line nearly to the outer margin, and small obscure blackish streaks are in the interspaces just before the outer margin. Ordinary spots wanting. Secondaries whitish at base, becoming dusky toward apex and to the middle of the outer margin; veins also dusky. Beneath whitish, powdery; primaries darker, without markings secondaries paler, with an obvious median line and a small discal spot.

Expands, 1.22 inches = 31 mm.

Habitat. — Peachland, British Columbia, July 8, 1907.

One female in rather poor condition from Dr. James Fletcher, collected by Mr. J. B. Wallis. The specimen seems to have been papered, and has the body somewhat pressed out of shape; but the wings are not marred and the legs are present. The resemblance at first sight is to *griseicollis*; but the connected median lines suggest *figurata*. In the half dark head and collar the species seems to be unique.

Calocampa mertena, new species.

General color smoky gray over a dull rusty yellowish red. Head darker in front; above middle and vertex, of the paler ground or tending to even more yellowish. Collar rusty reddish to yellowish, crossed by narrow darker lines, tipped with blackish. Thoracic disc varying from rusty brown to smoky gray, the contrast with collar varying materially and, in the case of the single female, scarcely marked. Abdomen rather even rusty reddish in both sexes. Primaries smoky gray below the median vein, the costal area rusty reddish over luteous, varying in brilliancy with the freshness of the specimen. All the transverse maculation just traceable. At the base the pale shading is whitish above a black or dark streak, and in this pale area are loop-like brown markings in the interspaces. The t. a. line so far as it is visible has loop-like outcurves in the interspaces. In the cell the orbicular and reniform are marked by a blackish spot in which the orbicular is completely outlined in black and the inner part of the reniform is well marked. The center of the reniform is marked by a contrasting pale crescent, outwardly diffuse and shaded with reddish, and that tint usually shades into the pale area which then extends through the upper half of the wing, to the margin. T. p. line about parallel with the outer margin, usually reduced to small, punctiform venular dots, in the best cases a slender crenulate line. S. t. line marked by a more or less obvious preceding shade, quite rigidly oblique and, above vein 5, emphasized by a black somewhat lanceolate streak. There is a traceable median shade in most of the specimens. Secondaries lustrous, smoky, reddish-brown, semi-transparent. Beneath rusty brownish, varying in depth; secondaries with an obvious outer line and discal spot, primaries with the same maculation indicated.

Expands, 1.70-2.00 inches = 43-50 mm.

Habitat.—Washington; Seattle, Pullman and Olympia; British Columbia; Rossland and Arrowhead Lake.

Eleven males and one female: all the dates for males in spring and examples somewhat flown; the female without date, from Dr. Barnes' collection, in fresh, perfect condition. I have had this series separated in my collection for a long time; but having only males was not certain that I did not have a race of *cineritia* to deal with. The receipt of the female from Dr. Barnes with his own conclusion that it was a distinct species, determines me to give it a name. It is paler throughout than *cineritia*, with the contrasts between costal and infra-median area much more decided, while the transverse maculation is

almost entirely lost. I have well-marked *cineritia* from Calgary, Alberta; Aweme, Cartwright, and Brandon, Manitoba; and none of them is readily confused with this new form.

Xylina nasar, new species.

Ground color of head, thorax and primaries bright, clean bluish gray, all the maculation cleanly and sharply defined, a distinct reddish brown shade in the reniform and above the internal angle of primaries. Head with a black transverse line across lower part of front, below which it is brown. A black line across collar, surmounted by a narrow, clean-cut white line, and shading off inferiorly into the ground. Patagia with margins dusky. Primaries with the transverse lines strongly angulated, narrow, black, edged with gray, tending to become broken. There is a black longitudinal line at base, which extends into the outward tooth of the t. a. line, but does not reach the line, and this line is edged with whitish above and is diffuse inferiorly. The outward tooth of the t. a. line meets an inward tooth from the t. p., the connection between the two formed by a black bar which is diffuse above. An oblique blackish shade extends from the middle of the costa to the t. p. line at vein 3, and this becomes outwardly diffuse and obscures the lower part of the reniform. S. t. line strongly dentate, the teeth on veins 3-4 nearly reaching the outer margin, preceded by a brown and black shade, from which black streaks extend inward below vein 3 and above vein 4. There is an outer, denticulate gray line. Orbicular very large, ovate, concolorous, incompletely outlined. Reniform large, upright, centrally a little constricted, incompletely outlined, inferiorly a little obscured by the oblique dusky shading. Secondaries gray, with a coppery red shading, and the abdomen is smoky, with the same coppery overlay. Beneath whitish with smoky powdering; a vague discal spot and outer line on all wings, tending to become lost on primaries and fairly well marked on secondaries.

Expands 1.44-1.52 inches = 36-38 mm.

Habitat. — Redington, Arizona (Dr. Barnes).

Three males and two females in good condition from Dr. William Barnes. They are allied to the eastern *levida* and *thaxteri* in type of maculation, but obviously distinct from both. The specific name is a suggestion from Dr. Barnes.

Xylina atara, new species.

Ground color of head, thorax and primaries a rather dull blue gray, all the maculation diffuse, indefinite, no color in the wings at any point. Head with a black, surmounted by a white, frontal line. Collar, with a clean white median line surmounting a black shade which is inferiorly diffused into the ground. Median lines as in *nasar*; but all vague and diffuse, the basal line being scarcely marked in some specimens. The connection between the median lines is a blackish shade, and the oblique shade from costa to t. p. line is just traceable in most specimens. S. t. line similar to that of its ally, without the black, well defined markings extending inwardly. Secondaries whitish with a coppery tinge. Beneath whitish, powdery, all wings with a vague discal spot.

Expands, 1.52-1.60 inches = 38 to 40 mm.

Habitat. — Redington, Arizona (Dr. Barnes).

One male and six females in good condition. I was strongly inclined at first to consider this a washed-out form of *nasar*; but the material is in too good condition to permit this belief.

All the specimens of both sexes are uniformly larger, they all lack the brown and reddish scales in the primaries, and the maculation is uniformly diffuse, not rubbed nor faded. The strong inward black marks from the s. t. line are altogether lacking and, on the whole, I have no doubt we have a good species to deal with. On this point Dr. Barnes agrees with me and I have adopted his suggestion as to a specific name.

Copicullia luteodisca, new species.

Ground color bright bluish gray. Head with vertex and a cross bar below antennæ brown. Base of collar blackish, edges of patagia blackish margined, disc dusky. Abdomen yellowish, with white hair at base, dorsal tuftings small. Primaries with the ordinary spots distinctly outlined, sometimes tinged with yellowish; a diffused yellowish shading in the submedian interspace between the median lines; an obvious streak above the anal angle; the median lines obscure. A very fine blackish line from base to t. a. line in the submedian interspace, very easily lost in a somewhat rubbed example. T. a. line very strongly dentate, irregular, single, not well defined. T. p. line barely traceable by interspaceal blackish marks to vein 2, below which it is narrow, single, blackish and cuts the outer edge of the yellowish shading. There is a traceable, somewhat paler gray s. t. shade line. A series of dusky terminal marks becoming black and continuous below vein 3. A somewhat diffuse black streak from t. p. line in submedian interspace extending obliquely upward to the outer margin just above vein 2. Orbicular ringed with black, broadly oval, center concolorous or tinged with yellow, and with a black dot. Reniform rather small, broad, outlined in black, the upper margin tending to become incomplete, and to a filling of yellowish scales, with blackish central line. Secondaries white with a broad smoky margin, veins smoky and fringes white. Beneath white, tending to a smoky outer margin on all wings; breast gray.

Expands, 1.60 inches = 41 mm.

Habitat. — Deming, New Mexico, September 1-7.

Two females in good condition from Dr. Wm. Barnes. The species is allied to *antipoda* Strck., in the distinct ordinary spots, but differs in the darker coloring, the diffuse supra-anal streak, the yellow shadings on the disc of wing, and the very neatly margined white secondaries. The species seems very different from anything previously described and is not included in any of the forms enumerated by Hampson.

Cucullia obtusa, new species.

Ground color whitish gray, streaked and powdered with black. Head gray inferiorly, with a black frontal line, then with a brown and gray line and a brown ver-

tex. Collar inferiorly brownish, limited by a black transverse line. Thoracic markings broken and undefined. Primaries powdery and streaked with blackish and black, with a distinct yellowish shade in the discal cell, the ordinary spots lost and the median lines fragmentary. On the costa, oblique diffuse brown streaks mark the t. a. line and median shade, and a geminate black oblique streak marks the inception of the t. p. line. The t. a. line is just indicated by venular marks. The t. p. line may be traced as a narrow, rather even broken line from costa to vein 3. S. t. line present as a diffuse oblique whitish shade, outwardly marked by brownish patches in the interspaces, and by a subapical preceding shade. A series of black terminal dots in the interspaces, beyond which the fringes are cut with blackish. Secondaries whitish with a yellowish tinge at base and with a broad blackish outer margin in both sexes. Beneath, all wings whitish with a broad dusky outer margin.

Expands, 1.50-1.65 inches = 38-41 mm.

Habitat. — Santa Catalina Mts., Arizona; southern Arizona.

Two males and one female from Dr. Barnes; the southern Arizona example marked as taken by Poling. The specimens are very much alike except in size, and are altogether different from any other of our species in the more trigonate primaries; the lanceolate form being almost lost. There is no subanal streak and the type of maculation becomes more like that of some of the normal hadenoid forms.

Tæniocampa occluna, new species.

Ground color dull grayish luteous, more or less densely powdered with smoky and blackish. Head and thorax concolorous, the patagia tending toward a blackish submargin. Primaries with all the maculation present but broken, and so powdered with blackish or smoky scales that the ornamentation is somewhat difficult to make out. Basal line geminate, black, outwardly convex and connected with base by a short blackish streak. T. a. line geminate, rather well removed from base, very incomplete, outwardly oblique, with a very slight outcurve. T. p. line geminate, outer portion becoming punctiform, rather even in general course, outwardly curved to vein 6, then inwardly oblique and with a slight incurve to the inner margin. S. t. line yellowish, irregularly and strongly sinuate, preceded by a somewhat darker shading. A series of small blackish terminal lunules separated by yellowish dots on the veins, beyond which the fringes are narrowly cut with yellow. Claviform very small, loop-like, outlined in black; but tending to become lost. Orbicular round or a little oval, small or moderate in size, concolorous, more or less completely outlined by black scales. Reniform large, a little oblique, somewhat constricted at the middle, the lower portion larger and broader than the upper, dark filled, incompletely outlined by black scales. Secondaries whitish at base, darkening gradually to a smoky terminal margin which is broader in the female; veins smoky and a trace of a smoky discal lunule: fringe whitish. Beneath, powdery; all wings with a more or less obvious outer line and a discal spot: primaries gray, tending to smoky; secondaries whitish, powdering sparse except along costal margin.

Expands, .92-1.12 inches = 23-28 mm.

Habitat. — Mesilla Park, New Mexico, May 9, 1900 (Cockerell),
1 ♂.

The single example from Prof. Cockerell has been in my collection since 1900 awaiting additional material.

The antennæ of the male are very shortly pectinated — almost serrate only — and the branches are set with dense lateral ciliæ and furnished with a longer terminal bristle so as to give the appearance of being fasciculate or bristle-tufted. Among the species with similar structure this has no very close allies, and it resembles rather an undersized *Perigea alfskenii* Grt. — in fact I have no doubt the two are confused in collections.

Tæniocampa quinque-fasciata, new species.

Ground color varies from mouse-gray to fawn-gray, or even to rusty reddish. Head and thorax concolorous. Primaries more or less irrorated, but not often obviously strigulate; crossed in whole or in part by five variably conspicuous lines or fascia. Basal line single, diffuse, brown, excurved, extending from costa to submedian vein. This line, while it is always traceable, tends to become lost and is rarely conspicuous. T. a. line single, rather well removed from base, with a moderate outcurve, more or less drawn in on the veins. This line is less diffuse, always traceable though sometimes incomplete, and usually well defined. Median shade broad, diffuse, at or a little beyond the middle of the wing, outwardly oblique to lower part of reniform, then with an inward, obtuse angle, obliquely to the inner margin. This broad shade is usually conspicuous and always obvious. T. p. line single, oblique from costa to vein 6, there forming a rather sharp angle and becoming crenulated to the inner margin. This line is usually obvious and sometimes conspicuous over the costal area, but tends to become lost below the angle. S. t. line yellowish-disjunct just below the apex, thence rather even to the inner margin, preceded by a variably distinct dusky shading which may be a mere edging and may extend nearly half way across the s. t. space. A series of small, dark terminal lunules. There is a black or dusky spot in the cell between basal and t. a. line, and usually another at the anterior margin of the orbicular spot. Orbicular large, concolorous, ovate, a little oblique, defined by a narrow, pale ring and tending to become obsolete. Reniform large, broad, kidney-shaped, outlined by a pale ring, tending to become dark filled inferiorly. Secondaries dusky in both sexes, the fringes paler. Beneath whitish, powdery, with a conspicuous outer black fascia and a black discal spot on all wings.

Expands, 1.40–1.65 inches = 35–41 mm.

Habitat. — Colorado; Glenwood Springs VII, Garfield Co., 6000 feet: Washington; Pullman, IV, 19, Seattle: Oregon, Corvallis III, 31: Vancouver, B. C., III, 31, IV, 6: Massett, Q. C. I., IV, 28.

Seven males and four females mostly in good condition, from various sources. My attention was drawn to this species by a somewhat discolored and very fully marked example received for determination from Dr. Fletcher. All the transverse maculation is practically complete, and the 5-fasciata application is obvious. In seeking to differentiate it in other respects I found among my examples of *pacifica*

some that were almost as well if not as conspicuously marked, and I divided them into two series which stood sharply enough defined when once separated.

The new species differs from both *alia* and *pacifica* in more even coloration; in the obvious or even conspicuous median shade; in the even, rather conspicuous s. t. line preceded by a distinct shade, and in the sharp angle formed by the t. p. line on vein 6.

Xylomiges argus, new species.

Head, thorax and primaries pale, powdery ash gray. Head and thorax with darker gray powderings, so as to give the surface a dusty appearance. Collar with a somewhat darker gray line. Abdomen yellowish. Primaries without contrasts, yet all the maculation fairly well traceable. Basal line geminate, darker gray, extended to vein 1. T. a. line geminate at its inception, the inner line tending to become lost, the outer dark gray, a little diffuse, with a very long outward angle in the submedian interspace and a smaller above the margin. T. p. line single, broken, outwardly extended on the veins, with a long inward angle in the submedian interspace, not quite meeting that of the t. a. line. S. t. line pale, fragmentary, best marked by a series of blackish preceding spots in the interspaces. A blackish terminal line, broken by yellowish points on the veins. Claviform short but broad, obscurely outlined by dark scales. Orbicular round or nearly so, a little paler, with a central dusky spot. Reniform moderate in size, broad, a little constricted at middle, oblique, incompletely outlined, usually with a few rusty scales outwardly. As a whole the wing is a little darker over costal region from base to t. p. line, and there is a tendency to an oblique dusky shading from lower edge of reniform to the outer margin just below apex. Secondaries white, with small dusky terminal lunules. Beneath white, primaries powdered with gray, all wings with a darker discal spot and a tendency to an extra-median line.

Expands, 1.32-1.42 inches = 33-35 mm.

Habitat. — California: Witch Creek II, Argus Mts., V.

One male and four females in good condition; the Witch Creek examples through Mr. R. F. Pearsall, the Argus Mts. examples from Mr. T. Kemp.

This is the narrowest winged species we have and the primaries are more nearly parallel than in any other species. The markings are very obscure and at first sight the species looks only a little mottled, dusty gray.

The antennæ of the male are serrate and fasciculate, and the species thus belongs with *indurata* and *curialis*, while differing markedly from both.

Xylomiges nicalis, new species.

Head, thorax and primaries a soft bluish gray, in the males with a faint reddish tint and a somewhat glossy surface. Head and thorax without obvious maculation.

Primaries, in the male the maculation tends to become altogether lost, the t. a. and s. t. lines being most frequently defined and the reniform usually marked by a reddish cloud. In the female the primaries are more powdery, the veins tend to become darker, and most of the maculation is usually traceable, the s. t. line being always most obvious. In none of the specimens is all the maculation present, so that the description is made from several examples. Basal line geminate, the component parts widely separated, almost crossing the wing and strongly angulated. T. a. line single, diffuse, outwardly angulated at its middle, inwardly so on the subcosta and submedian. A broad, diffuse median shade is traceable across the wing in most examples. T. p. line single, irregular, diffuse, only a little outcurved over cell. and almost less incurved below. A series of interspaceal blackish spots mark the s. t. line. A series of blackish terminal marks, beyond which is a narrow, interrupted pale line at base of fringes. Claviform short and broad, concolorous. Orbicular round or nearly so, not outlined, a little paler than the ground, with a dusky center. Reniform large, upright, incomplete, a little constricted at middle. Secondaries white with a series of black terminal lunules and a tendency toward a series of dusky extra-median venular dots. Beneath white, primaries more or less powdery; all wings with a more or less obvious discal spot and a tendency to an extra-median line.

Expands, 1.40-1.70 inches = 35-42 mm.

Habitat. — Pullman, Washington, April and May.

Seven males and six females, all in good condition, received from the Experiment Station some years ago and but recently separated out. The antennæ of the male are distinctly serrate and fasciculate and therefore this is related to *indurata* and *curialis*. It is however a much larger species than *argus*, broader winged, and with quite a different appearance. The marked difference between the sexes in this species is quite characteristic, and besides the differences already pointed out, it may be added that the males run smaller, although the largest male more than equals the smallest female.

Xylomiges tantiva, new species.

Ground color bluish gray, powdery. Head and thorax concolorous, patagia tending toward a dusky submargin. Primaries powdery, all the transverse maculation obscured, tending toward a dusky shading over costa and in the terminal space. So far as they are traceable, the median lines are much as in *nicalis*; but always incomplete and the t. p. line often altogether lost. S. t. line pale, even, preceded by a narrow dusky shade which is sometimes more or less broken; but never forms a series of separate spots. A dusky terminal line. Fringes interlined with pale. Claviform moderate in size, quite usually traceable. Orbicular round, obscurely outlined, a little paler than the ground, with a dusky center. Reniform large, upright, a little constricted at middle, with a shading of reddish or brown scales outwardly. Secondaries white, with dusky terminal lunules and a tendency to a dusky, venular extra-median line. Beneath white, more or less powdery on primaries; all wings with a discal spot and a tendency to an extra-median dark venular line.

Expands, 1.40-1.60 inches = 35-40 mm.

Habitat. — Redington, Arizona.

Five males and four females from Dr. Wm. Barnes, at whose suggestion I give the specific name. Some of the examples are marked merely southern Arizona, Poling, and were probably taken by that gentleman.

This is yet another of the *curialis-indurata* series, and differs from *nicalis* in the more powdery surface, the practical similarity of the sexes, the continuous s. t. shading before a definite pale line and, lastly, by the much less marked thickening of the male antennæ. The joints here are much less marked than in *nicalis* and the bristle tufts are small and weak.

Tetanolita greta, new species.

A light smoky over a whitish base, the latter becoming more obvious as the specimens become flown. Head and thorax concolorous, the abdomen a little paler, edges of segments narrowly white. Primaries in well preserved specimens rather uniformly light smoky to the t. p. line, beyond which is a whitish or paler shade that is almost evenly oblique and outside of that the terminal area is much darker to the paler fringes. In a flown specimen the contrasts are less marked and an oblique median shade becomes apparent, as well as a dusky t. a. line; both of which are obscured in the full powdering when present. T. a. line vague at best, even, a little out-curved. T. p. line narrow, smoky, crenulate, somewhat irregular but, on the whole, about parallel with the outer margin. S. t. line pale, sinuate, appearing as a powdering in a dark specimen and as a well defined continuous line in a flown example. A series of black terminal lunules. Orbicular a small yellow dot. Reniform an undefined blackish line or blotch, partly outlined by yellow scales. Secondaries on the whole continuing the maculation of primaries. The base to a little beyond the middle is somewhat paler than primary, then come the continuation of the t. p. line in the form of a narrow, diffuse band, and the narrow pale shading, outside of which there is a broader dark terminal area. Through this runs a continuation of the s. t. line which is continuous, more distinct and obviously denticulate. The terminal black lunules are narrow but form an almost continuous line. Beneath, much paler and more powdery, the transverse maculation of upper surface more obvious but less definite, and all wings with a dark discal spot.

Expands, .90 inch = 23 mm.

Habitat. — San Diego, California IX, 23, X, 6.

Two male specimens from Mr. George H. Field: one of them fully clothed with scales, the other a little flown but otherwise in equally good condition. The palpi curve well up over the vertex and the fringing is rather sparse. Antennæ with conspicuous long, slender lateral bristles and shorter fine hair. At about one third from base is the usual little scale tuft covering only a slight distortion of the antennal joints.

As compared with the described species, this is nearest to *floridana*, than which it is larger, without the slightly reddish tint, and decidedly more powdery. It is broader winged than any others of the species and the pale shade beyond the t. p. line gives the insect a characteristic appearance.

The character of the sexual tufting on the legs cannot be made out for lack of material, at present.

Tetanolita fulata, new species.

Ground color pale, washed-out luteous, shaded with smoky and all the lines smoky. Primaries more densely scaled and a little darker than secondaries, with a broad smoky shade before the t. p. line, not contrasting, and a better marked darkening preceding the s. t. line and extending to the outer margin. The basal line is marked by a smoky costal dot. T. a. line single, smoky, irregular, on the whole with an even outcurve, rather close to base of wing. T. p. line single, irregular, somewhat dentate on some of the veins, outwardly angulate on the costa, then as a whole almost parallel with the outer margin, well removed outwardly so as to leave a broad median space. S. t. line yellowish, well marked through the dark shading, a little irregular but, on the whole, parallel with outer margin. A series of rather well-marked, large, blackish terminal lunules. The orbicular is a small yellow dot, which is sometimes much obscured. Reniform a narrow upright yellow bar or crescent, with a little blackish dot near upper and one near lower border. Secondaries palest at base, gradually becoming smoky outwardly, interrupted at about middle by the continuation of the t. p. line of primaries which is dark, followed by a paler shading, and extends across the secondaries. The pale s. t. line is also continued across the hind wings and is broader, more even, and more conspicuous. A series of black terminal lunules. Beneath paler, more powdery, with the maculation of the upper side incompletely reproduced.

Expands, .76-.82 inch = 19-20 mm.

Habitat. — Pennsylvania; New Brighton IX, 19 (Merrick), Highspire VI, 22: Illinois: Quincy IX, 1-15 (Poling).

The types are two males and two females in good or fair condition, and I have had under examination 5 other examples from the Pennsylvania State collection taken at Harrisburg, at electric light, VIII, 22, 28, and Highspire, V, 26, IX, 28. The Highspire example in my collection came to me through a New Jersey correspondent, and I do not know the original collector.

There is considerable variation in the specimens due mostly to the difference in amount of smoky powdering; the markings remaining about the same. The pattern is the same as in *floridana* Sm., than which this is a somewhat smaller, narrower winged, much darker and less contrastingly marked species. There are other examples in Mr. Merrick's collection I have no doubt.

Renia exserta, new species.

Dull smoky gray or luteous, sometimes with a reddish tint. Palpi darker at sides. Head and thorax concolorous; abdomen scarcely paler, with narrow paler edgings to segments. Primaries rather evenly colored, the basal area on the whole a little paler. T. a. line rigidly upright, yellowish, outwardly shaded with smoky brown. T. p. line even, yellowish or whitish, with a broad outcurve over cell and a less marked incurve below, just enough dark edging to the line to make it stand out conspicuously. S. t. line broken, irregular, yellowish, marked by brownish preceding shades, of which those at about the middle of its course are best marked. A series of small black terminal lunules. Orbicular a small, undefined yellowish blotch. Reniform upright, narrow, yellowish with black dots at either end. Secondaries a little paler than primaries; a narrow, pale, median line continuing the t. p. line of the fore wing across the hind wing; a broken dusky terminal line; between the median line and the margin there is another, more indefinite and fragmentary, pale line. Beneath more rusty, powdery, with extra-median and s. t. line and discal spot on all wings.

Expands, 1.10-1.12 inches = 27-28 mm.

Habitat. — Trenton, Ontario, VIII, 11, John D. Evans; London, Ontario, without date.

One male and female, in good condition. The female, from London, has been in my collection for years and I have kept it associated with *flavipunctalis* for lack of companions to prove that it was not merely an aberration. From whom I received it I do not now remember, and the label gives no indication. Recently I received a nice male from Mr. Evans, and am now convinced that the species is a good one, differing from all others in the genus by the very rigid t. a. line and the very even, contrasting, bi-sinuate t. p. line, which is continued with equal distinctness across the secondaries.

Renia tilosalis, new species.

Ground color in the male blackish smoky throughout; in the female the primaries distinctly red-brown. Head and thorax concolorous with primaries in each sex. Basal line traceable across the costal area in some specimens. T. a. line single, a little darker than the ground, often preceded by a paler or even whitish line, a little irregular, slightly excurred at the middle of its course; but as a whole nearly upright. T. p. line single, narrow, darker than the ground, irregularly denticulate, followed by a paler shading which, in the male, is often whitish and conspicuous, and on the costa forms a distinct paler or whitish spot. S. t. line pale or whitish, very distinct and almost rigid to vein 5, then much more obscure, with an inward angle followed by an outcurve, and that in turn by a much less marked inward angle. In the female the line is more distinct and is usually preceded by a darker shade. A series of black terminal lunules, followed by a pale line at base of fringes. There is a diffuse darker, almost upright median shade crossing the wing over or just within the reniform, much more obvious in the female than in the male, in which it is often lost in the dark ground. Orbicular round, yellowish, not outlined, tending to become lost. Reni-

form a narrow pale or yellowish oval with a black central line ; this line often broken into two black dots and sometimes diffused so as to fill the entire spot. Secondaries blackish smoky in both sexes. The t. p. line of primaries is continued as a crenulated blackish line across the wing, and is outwardly bordered by a more or less well-marked diffuse whitish shading. The s. t. line of primaries also is continued across the secondaries as a narrow pale or whitish line preceded by a slightly darker shading. A series of black terminal lunules followed by a pale line at base of fringes. Beneath blackish, powdery, all wings with a discal spot, the outer lines of both wings more prominently reproduced.

Expands, .90-1.00 inch = 22-25 mm.

Habitat. — Long Island, New York, July 24, August 11; Chester, N. J., August 28, Jamesburg, N. J., Oak Ridge, N. J., August 7; New Brighton, Penn., July 19-August 2.

Nine males, six females most of them in good condition. The Long Island and Oak Ridge specimens are from Mr. E. Shoemaker; the New Brighton specimens are from Mr. H. D. Merrick, the others are from the college collection.

This species belongs with *factiosalis* in type of maculation ; but is much smaller, quite different in color and varies in a different direction. In well marked males the tendency to a white band following the t. p. line across both wings is often conspicuously shown and on the secondaries some females are almost as well marked. This character is also the most obvious distinctive feature when a series is under observation.

NOTES ON COLEOPTERA.

By W. KNAUS,

McPHERSON, KANSAS.

For the past ten or twelve years, the writer has been on the look-out for *Sicyobius broussii*, described by Dr. Horn in 1884. Season after season the vines of the wild gourd, *Cucumis perennis*, were examined for this Cerambycid, but always without success, until June 6, 1908, when I was at Lindsborg, fourteen miles north of McPherson. On that day, while waiting for a train, I went south along the Smoky Hill River, just beyond the city limits, and on examining a gourd vine was so fortunate as to find a single specimen of this modest little gray and white insect. A careful inspection of all the gourd vines in the vicinity did not disclose any further specimens.

Four days later, while in Ashland, Clark County, I took this species

in numbers on the gourd vines. On the slope of the banks of Bear Creek, the wild gourds had been covered with sand, and the vines came up in bunches that had not yet begun to spread. On these bunches the beetles were numerous, and could be picked off the vines without difficulty. When first discovered, at about six o'clock in the evening, they were sluggish and did not attempt to fly. When disturbed they dropped to the sand, which they resembled closely in color, lay quiet for a short time, and then crawled slowly away. In the hotter parts of the day, their movements were much more rapid. Sometimes when taken hold of on a vine, they clung tightly with their feet and could with difficulty be loosened. On single vines, they would usually drop to the sand if the vine was touched.

I collected some forty specimens the evening I found them, but on returning to the place the next morning to renew the harvest, I found that some vagrant cow had browsed over the spot and had eaten the bunch of vines that I was depending upon for further captures. However, from the remains of the vines and others more scattered nearby, I secured some twenty additional specimens.

My specimens in this catch varied in length from 7 mm. for the males to 9½ mm. for the females; the width being from 2 to 3 mm. The annulation of the antennæ seemed to be more noticeable in the females. Two oblique fascia or patches of white adorn the gray elytra; a less marked one, one third from the base, and a well defined one, two thirds from the base. These also seemed to be the more constant in the females than in the males. A more obscure fascia on the declivity of each elytron, running at a different angle from the other elytral fasciæ, can almost always be observed. The scutellum always shows a patch of white hairs.

The stems of the growing and of the decaying vines of the previous year were examined for the larvæ of the *Sicyobius*, but neither larvæ nor pupæ were found. The stems of the growing vines showed numerous galls or swellings, each of which contained small white larvæ. A month later these larvæ had reached their full growth of an inch or an inch and a quarter in length, were thick and fleshy and of a light yellowish or opalescent color. They always bored their way out of the gall and entered the ground for pupation. Not being equipped on the trip for securing and carrying the pupæ, I did not collect any, and do not know what insect the final transformation disclosed.

While collecting *Sicyobius* at Ashland, I noticed in the decaying

branches of the gourd vines a small dark brown Scolytid. The preceding year's vines and even fruit, proved to be packed full of these small insects, their larvæ and pupæ. I collected a good series of the perfect insect, and Dr. Hopkins, of the Bureau of Entomology at Washington, D. C., pronounced them to be a species of *Xylocleptes*, either *cucurbitæ* Lec. or a new species, probably the latter. It was the first time I had observed the species in the state, and the present season I hope to secure both the larvæ and pupæ of this insect.

ON THE USE OF COAL TAR CREOSOTE AS A PREVENTATIVE OF CABINET PESTS.

BY WM. PHILLIPS COMSTOCK,

NEWARK, N. J.

An article by Dr. Geo. W. Bock, entitled "An absolutely sure method of preservation of natural scientific collections against insect enemies" appeared on page 443 of the December, 1907, issue of the Entomological News. This interested me at the time and shortly afterward I made an experiment with the method. Dr. Bock used thimbles, to which he had soldered pins, for affixing the same in cabinet; these he filled with medicated cotton which he soaked with coal tar creosote.

Not having time to prepare the thimbles, I prepared another receptacle for the creosote. I bought a box of no. 0 gelatine capsules —100 cost \$.10.* Throwing aside the top I used the larger bottom of the capsule as a receptacle to hold the creosote. My method of preparation was as follows: I first inserted a little tuft of common absorbent cotton into the capsule with my forceps and filled about 50 thus. To support the capsule in the box I used a common pin which I first heated slightly over a lamp and then thrust through the capsule at right angles to its vertical axis and near the top (see Fig. 1). The heated pin fused itself through both sides of the gelatine capsule, fastening firmly. A little practice will teach the experimenter the trick of heating the pin to the proper temperature, so that the work may be done rapidly. I used medium size common pins but a black headed steel pin, I believe, would have proved superior.

The operation of filling the capsules may be done with a medicine dropper and takes little time.

* Empty gelatine capsules are manufactured by Parke, Davis & Co., Detroit, Mich.

These capsules prepared thus, were used in 12" x 16" cabinet drawers, two to the drawer. They held down the pests in a very much neglected and crowded cabinet for nearly a year until I found time to work over the material. In pinning the capsules into the drawers I at first thought it necessary to pin them into the sides so as to keep them upright, but later I pinned them into the bottom in a slanting position with good results. By inserting a stout insect pin obliquely to the vertical axis of the capsule (see Fig. 2), it may be pinned in the bottom of the drawer and there is no chance of the creosote running out. This is a fault that I anticipated but it did not

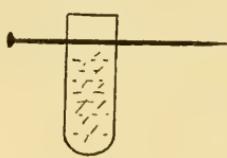


FIG. 1.

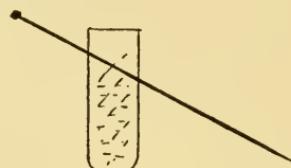


FIG. 2.

occur, the cotton absorbing all the creosote. The capsules are small, not very noticeable and maintain a strong odor of the creosote in the cabinet. The drawers of the cabinet were quite tight, however, and were not opened a half dozen times in ten months. I believe that the capsules would need refilling about once in every six months where the drawers were frequently opened.

It is better to use a small amount of cotton and not to pack it into the capsule. Do not use too much creosote either. Capsules in which the cotton is loose are much easier to refill. When capsules are just filled, pin them in an old box set up on end and let them remain a day, so that any creosote which may have run over on the outside will dry before putting capsules into the cabinet.

THE NOTONECTID GENUS BUENOA KIRKALDY.

By J. R. DE LA TORRE BUENO,

WHITE PLAINS, N. Y.

These notes by no means aim at exhaustiveness. Much is necessarily omitted, but as their main purpose is to unravel the tangle into which have fallen the species of the genus occurring in the eastern United States, it does not appear to be appropriate to go minutely into details best treated of in a monographic revision of the genus.

I. In 1904, in "Über Notonectiden,"* Kirkaldy separated the genus *Buenoa* from *Anisops*, to contain the American species, distinguishable from the Old World forms by having two-jointed anterior tarsi in the male. He lists 12 species as valid and reduces four to synonymy (not including one apparent misidentification). One species, however, is not listed but is mentioned in the text (p. 123), this being Fieber's *Anisops elegans*. The actual number of species is, however, much greater, as even counting synonyms, there are only seven continental *Buenoas* noted for North America, whereas I am familiar with five recognized species (excluding synonyms), and possess in addition some two or three undescribed forms from the west and south. The described species known to me are the following:

Buenoa albida Champion. Texas; Mexico.

B. carinata Champion. Mexico.

B. pallipes Fabricius. Mexico.

B. elegans Fieber. New Jersey.

B. platycnemis Fieber. New York; New Jersey; Illinois.

To which must be added: *B. margaritacea* Bueno hereafter mentioned.

II. When I first began to work on the waterbugs, I named some by the fatally easy method of exclusion. If you know all the species except one for a certain locality, why, the one that was new to you must necessarily be the remaining species. Or, if only one species was given for a specific region, why, the most abundant, and in fact, the only one taken must be it. Accordingly, when I found a common and abundant bug, I looked into Uhler's Check List, and there found only one species of *Anisops* given as occurring in the Atlantic States; namely, *Anisops platycnemis* Fieber. Now, whom should I follow, if not our most distinguished hemipterist? I promptly did so, to find myself in good (if misled) company. Later, possession of Fieber's "Rhynchartographieen" gave rise to many misgivings, even though Uhler's † semi-popular description in the Standard Natural History confirmed my first idea as to *A. platycnemis*. Subsequently I took, although in small numbers, another species, which but served to accentuate my previous doubts. Within the last year another local form turned up to increase the problem. However, once a sufficiency of material was in hand, the solution of the problem was simple enough.

* Wien. Ent. Zeit., XXIII, VII, 120 (Aug. 31, 1904).

† 1852, Abh. böhm. Ges. Wiss. (5), 7, pp. 1-64.

The *Buenoa* known to a generation of American entomologists as *Anisops platycnemis* was an undescribed species. The other two forms were readily identified by reference to Fieber (op. c., pp. 61-62), as the true *Buenoa platycnemis* and its close congener *B. elegans*. In passing it may be noted that these forms are so close that eventually a sufficiently long series may prove them cospecific, but the time is not yet for uniting them.

In *Standard Natural History** Uhler describes what he considers to be *Anisops platycnemis* Fieber, mainly by color characters (a very unreliable and misleading method in Hemiptera), but he makes the concrete statement that the length is "about $\frac{1}{4}$ of an inch to the tip of the wing covers." Now "about $\frac{1}{4}$ of an inch" may mean 6 mm. or 7 mm., each of which differs from $\frac{1}{4}$ inch by a small fraction, the former by only $\frac{1}{4}$ mm., or about $\frac{1}{100}$ in., and the latter by $\frac{3}{4}$ mm., equivalent to $\frac{3}{100}$ in., which are almost negligible quantities when considering an "about" dimension. At any rate, Fieber states that his *Anisops platycnemis* is " $2\frac{1}{2}$ lines" in length. A "line" being $\frac{1}{2}$ of an inch, we therefore have an insect $\frac{5}{4}$ of an inch in length, which differs but fractionally from 5 mm. (exactly .0085 in., or .21 mm.). This is one full millimeter shorter than Uhler's bug if we consider it just $\frac{1}{4}$ inch long, which in such a small insect is quite an appreciable measurement, and one serving to separate species. Now, in my "Notes on the Notonectidae of the Vicinity of New York," † I referred to the species in question, of course, as *Anisops platycnemis*, as before noted, and described it, mainly structurally, if rather briefly (p. 236). There the dimensions are given as 6.7 mm. to 8.1 mm. long, and 2 to 2.3 mm. broad. The shorter length, of course, is "about $\frac{1}{4}$ " inch, and, taken in connection with Uhler's color characters with which it agrees as closely as is to be expected in a character so variable as is color in waterbugs, it is evident that the two descriptions refer to the same insect. Again, Fieber distinctly says "Augen gross," which is certainly not the case with the *pseudo-platycnemis*, because in this form the eyes are not noticeably larger than the average in the genus, whilst in the genuine they are. The synonymy of this species therefore becomes :

Buenoa margaritacea Bueno, 1908, Journ. N. Y. Ent. Soc., XVI, 4, p. 238.

* 1882, Vol. II, p. 253.

† 1902, Journ. N. Y. Ent. Soc., X, 4, pp. 230-236.

= *Anisops platycnemis* Uhler, 1882, Stand. Nat. Hist., II, 250; Bueno, 1902, Journ. N. Y. Ent. Soc., X, 236; 1904, Kirkaldy, Wien. Ent. Zeit., XXIII, VII, 123; and very many other authors (but not Fieber).

The three descriptions cited above will enable anyone to identify this species with certainty.

The three species of *Buenoa* thus far found in the eastern United States are, therefore: *B. margaritacea* Bueno, *B. platycnemis* Fieber, *B. elegans* Fieber, and they may be separated by the following table:

1. (2) Large species, over 6 mm. long 1. *margaritacea* Bueno.
2. (1) Smaller species, less than 6 mm. long.
3. (4) Eyes large and prominent; shape slender 2. *platycnemis* Fieber.
4. (3) Eyes large but not prominent; shape more convex 3. *elegans* Fieber.

Buenoa margaritacea appears to be very widely distributed in the north and I should not be surprised if it occurred in Canada, as in the United States, as far to the west as the longitude of Illinois, at least. Beyond that, other (and undescribed) forms are apt to occur. As to *B. platycnemis* and *B. elegans*, the latter I have seen only from New Jersey, but the former is found as far to the south as Washington, D. C., and west to Illinois.

In the south and west there are a number of forms very close to *Buenoa margaritacea* and naturally, some representatives of the Mexican fauna will be found in the border states, but as matters stand today, it would be hard work for anyone to pronounce positively on any of these forms in the absence of some definite work on the genus as a whole. A monographic revision of the genus therefore becomes imperative if we would have some fixed foundation on which to base our studies.

A DECADE OF NORTH AMERICAN FORMICIDÆ.*

By WILLIAM MORTON WHEELER,

BOSTON, MASS.

✓ 1. *Myrmica bradleyi*, new species.

Worker. — Length 4-7 mm.

Allied to *M. rubida* Latreille and *M. mutica* Emery. Head rectangular, as broad as long, with subparallel sides and straight posterior border. Mandibles moderately convex, pointed, with minutely denticulate blades. Clypeus somewhat

* Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 2.

convex in the middle, with nearly straight anterior border. Frontal area distinct. Antennal scapes simple, curved and feebly compressed at the base; funicular joints all longer than broad; club 5-jointed. Thorax rather slender, with pronounced mesoepinotal constriction; pro- and mesonotum evenly rounded in profile; epinotum unarmed, base slightly convex, passing through a distinct, but obtuse angle into the somewhat shorter, straight and sloping declivity. Petiole slender, fully three times as long as broad, in profile with a well-developed, cylindrical peduncle, armed with a small, acute, antero-ventral tooth, and surmounted by a low rounded node just behind the middle. Anterior slope of node concave, posterior more convex. Postpetiole fully $1\frac{1}{2}$ times as long as broad, subcampanulate; in profile with its upper surface rising in a gentle curve towards the posterior edge of the segment and then abruptly descending. Gaster elliptical, rather large.

Shining; head and thorax subopaque, petiole, postpetiole, gaster and legs glabrous. Mandibles densely striato-punctate. Clypeus, frontal area and head finely, longitudinally rugose, the rugae somewhat curved and diverging on the front but straight on the posterior portion of the head. Cheeks and posterior corners also coarsely punctate. Thorax finely rugose like the head, the rugae being transverse on the pronotum and base of epinotum, longitudinal on the pleurae and mesonotum. On the epinotal declivity they are faint or obsolete, and the surface is densely and finely punctate.

Hairs golden yellow, long, abundant and pointed, suberect or reclinate, covering the body and appendages throughout.

Mandibles, thorax, petiole and postpetiole brownish-yellow; head, mandibular denticles, gaster, legs and antennal scapes black; trochanters, bases of femora, knees, tips of tibiae, tarsi and antennal funiculi, except their clubs, yellowish-brown. In some specimens the mandibles are more or less infuscated, with paler masticatory borders; in certain individuals, also, the coxae are more or less yellowish like the thorax. Venter and sting brown or yellowish.

Described from fifteen specimens taken by Mr. J. Chester Bradley in Alta Meadow, Tulare County, California, at an altitude of 9,500 feet.

This beautiful species may be readily distinguished from the allied *M. rubida* of Europe and *mutica* of the western states by its color and its glabrous and much more slender petiole and postpetiole. In both the species mentioned the postpetiole is nearly as broad as long. The epinotum of *bradleyi* is more angular than in *mutica*, and therefore more like the epinotum of *rubida*. This form also resembles *bradleyi* in having the upper surface of the postpetiole smooth and shining. There is in my collection a pale yellow variety of *mutica* from Moscow, Idaho (J. M. Aldrich), with smooth and shining petiole and postpetiole, but these segments are much more robust than those of *bradleyi*.

2. *Pogonomyrmex (Ephebomyrmex) pima*, new species.

Worker.—Length 3.5–4 mm.

Head rectangular, a little longer than broad, with straight, subparallel sides and feebly excised posterior border. Eyes somewhat flattened, just in front of the middle of the head. Clypeus short, slightly convex in the middle, with straight, entire anterior border and without a tooth in front of each antennal fovea. Frontal area distinct. Antennal scapes reaching nearly half way between the eyes and posterior corners of the head; funicular joints 3–7 as broad as long, remaining joints distinctly longer than broad. Thorax short, robust, broader in front than behind, with rounded humeri; dorsum in profile broadly rounded. Epinotal spines approximated, erect, compressed, rather blunt, a little longer than broad at their bases, further apart than long, connected by a prominent transverse ridge, separating the base from the declivity of the epinotum. A prominent ridge also runs down the side of the declivity from each spine and forward on each side of the base. Metasterna projecting upward as acute, compressed teeth, shorter and broader than the epinotal spines. Petiole with a narrow, laterally compressed peduncle, which is as long as the node; the former with a blunt anteroventral tooth, the node in profile conical, with straight, subequal anterior and posterior slopes and rather angular summit; seen from above the posterior slope is subelliptical, $1\frac{1}{2}$ times as long as broad. Postpetiole campanulate, as long as broad, in profile evenly rounded above, with its anteroventral surface convex and protruding. Gaster elliptical, rather small, formed very largely by the first segment. Legs stout, with incrassated femora.

Mandibles opaque, striated throughout. Head, thorax, petiole and postpetiole opaque. Head, including clypeus and frontal area, covered with coarse, longitudinal rugæ, which diverge somewhat behind towards the posterior corners of the head and converge on the clypeus towards the middle of its anterior border. Interrugal spaces densely and finely punctate. Thorax coarsely reticulate-rugose, the rugæ being vermiculate and sublongitudinal on the pleuræ and mesonotal region. Neck finely and transversely rugulose. Epinotal declivity with a single pair of coarse ridges or rugæ between the pair descending from the bases of the spines. Petiolar node and postpetiole coarsely shagreened, with a few shallow and scattered punctures. Legs and gaster somewhat shining, the latter more finely shagreened than the petiole and postpetiole, with rather coarse, scattered, piligerous punctures. Antennal scapes opaque.

Hairs blackish, short, erect and stubby on the body, scarcely more oblique on the legs and antennal scapes and not elongated to form ammochætæ on the gula.

Rich ferruginous red, posterior portions of thorax somewhat darker; antennæ and legs yellow; mandibular teeth black.

Described from a dozen specimens taken by myself at Tucson, Arizona, and a single specimen taken at Phoenix in the same state.

This species is closely related to *P. (E.) nægeli* Forel from Brazil and *P. (E.) imberbiculus* Wheeler from Texas, but differs from both in lacking the teeth on the clypeus in front of the antennal foveæ, and in the sculpture of the head, petiole and postpetiole. In both the species mentioned the head is coarsely reticulate-rugose and in *nægeli*

this is true also of the petiole and postpetiole, in *imberbicus* of the petiole. From the latter species *pima* differs also in its much less shining gaster and somewhat smaller size.

3. *Pogonomyrmex* (*Ephebomyrmex*) *townsendi*, new species.

Worker. — Length 4 mm.

Head rectangular, scarcely longer than broad, with straight subparallel sides and feebly excised posterior border. Eyes moderately convex, just in front of the middle of the head. Clypeus short, convex in the middle, with straight, entire anterior border, and a large, blunt, erect tooth in front of each antennal fovea. Frontal area distinct, carinulate in the middle. Antennal scapes reaching a little more than half way between the eyes and the posterior corners of the head; funicular joints 3-7 as broad as long, remaining joints longer than broad. Thorax short, robust, broader in front than behind, with rounded humeri; dorsum in profile broadly rounded, somewhat depressed in the middle. Epinotal spines erect, approximated, and rather blunt, somewhat further apart than long, longer than broad at their bases, which are connected by a strong, transverse ridge and continued forward as a pair of ridges bounding the base of the epinotum and backward as another pair bounding the declivity. Metasternal teeth acute, laterally compressed, shorter than the epinotal spines. Petiole with a slender, laterally compressed peduncle, which has a blunt, antero-ventral tooth and is distinctly shorter than the node. In profile this has a shorter, straight and abrupt anterior, and a longer, more sloping, convex posterior declivity; seen from above the latter is subelliptical, about $1\frac{1}{3}$ times as long as broad. Postpetiole campanulate, as broad as long, in profile evenly rounded above, with a strong antero-ventral protuberance. Gaster small, elliptical. Legs rather stout, with incrassated femora.

Subopaque; mandibles striated throughout; clypeus longitudinally rugose, the rugæ converging towards the middle of the anterior border. Head covered with coarse longitudinal rugæ, which are straight and parallel and do not diverge towards the posterior corners. These rugæ are connected with one another by transverse rugæ and the spaces between them are filled with minute, dense, shallow punctures. Thorax somewhat more coarsely reticulate-rugose than the head, the rugæ distinctly longitudinal on the dorsum and pleuræ. Neck and base of epinotum between the ridges punctate rugulose; declivity with a few coarse and irregular rugæ. Petiolar node coarsely reticulate-rugose; postpetiole and basal half of first gastric segment densely and finely punctate, the former with indistinct longitudinal rugæ, the latter with sparse, piligerous foveolæ. Remainder of gaster and the legs more shining. Antennal scapes opaque, punctate and longitudinally rugulose.

Hairs rather short, abundant, pointed, yellowish in some lights, black in others, erect on the body, slightly oblique on the appendages, not elongated to form ammono-chætæ on the gula.

Rich ferruginous red, thorax somewhat darker behind; legs and antennæ yellowish; mandibular teeth black.

Described from a single specimen taken by Mr. C. H. Tyler Townsend at Ojo del Cerro Chilicote, Chihuahua, Mexico.

This species differs from *P. (E.) nægeli* in the sculpture of the base

of the epinotum, postpetiole and base of the gaster. The Brazilian species has the epinotum coarsely rugose, the postpetiole reticulate-rugose and the base of the gaster longitudinally striated. From *P. (E.) imberbiculus, townsendi* differs in the sculpture of the postpetiole and gaster and the greater opacity of the whole body; from *pima* in having prominent teeth on the clypeus, in the reticulate rugosity of the petiolar node, the sculpture of the head, etc.

4. *Leptothorax melanderi*, new species.

Worker. — Length 2 mm.

Head rectangular, a little longer than broad, with straight, subparallel sides, straight posterior border and eyes in the middle of the sides. Mandibles apparently 6 toothed. Clypeus moderately convex, with broadly rounded, entire anterior border, not produced in the middle. Antennæ 12-jointed; scapes reaching to the posterior corners of the head; first funicular joint as long as joints 2-5 together; joints 2-8 small, subequal, decidedly broader than long; club 3-jointed, its two basal joints subequal, together shorter than the terminal joint. Thorax rather robust, with rounded humeri and without mesoepinotal suture or depression; in profile the dorsum is uniformly and feebly rounded. Epinotal spines stout, acute, longer than broad at their bases and nearly as long as their distance apart, directed backward and slightly outward and upward. Petiole about $1\frac{1}{2}$ times as long as broad, broader behind than in front, in profile conical, with rather acute apex, its anterior declivity concave and longer than the posterior declivity which is more abrupt and slightly convex; anteroventral tooth of peduncle prominent and acute. Postpetiole from above subrectangular, about $1\frac{1}{3}$ times as broad as the petiole, and $1\frac{1}{2}$ times as broad as long, slightly broader in front than behind, with distinct anterior angles; in profile convex in front above, depressed behind. Gaster elliptical, rather convex, with rounded anterior corners. Legs of the usual shape.

Opaque; gaster glabrous and streak down the middle of the head and clypeus slightly shining. Mandibles coarsely striato-punctate. Clypeus and head finely, longitudinally rugose, the latter under a higher magnification also minutely reticulate. Thorax, petiole and postpetiole uniformly and densely punctate.

Hairs white; sparse, erect and clavate on the body; slender pointed and appressed on the mandibles and appendages; longer and more oblique on the femora than on the tibiae.

Dark brown; gaster black; mandibles, clypeus, cheeks, gula, appendages, neck and articulations of pedicel brownish; femora infuscated in the middle. Mandibular teeth black.

Described from a single specimen taken by Mr. A. L. Melander on Moscow Mountain, Idaho.

This species is closely related to *L. nevadensis* Wheeler, but differs in being more opaque, of a darker color, in having joints 2-8 of the funiculus shorter, the clypeal margin entire, the thorax less narrowed behind and the nodes of the petiole and postpetiole of a different configuration.

✓ 5. *Leptothorax furunculus*, new species.

Worker.—Length 2-2.6 mm.

Head longer than broad, subrectangular, with very feebly emarginate posterior border and slightly convex sides, with the eyes slightly in front of their middle. Mandibles 6-toothed. Clypeus convex, with rounded, entire, rather projecting anterior border, its disc with a longer median and a pair of shorter lateral carinæ. Antennæ 12-jointed; scapes not reaching the posterior corners of the head; first funicular joint as long as joints 2-5 together; joints 2-7 narrow, subequal, broader than long, joint 8 as long as broad; club 3-jointed, its two basal joints subequal, together shorter than the terminal joint. Thorax somewhat narrower behind than in front, with rounded humeri; dorsum flattened, with a distinct mesoepinotal suture and impression. Epinotal spines about as long as broad at their bases, rather acute, further apart than long, directed upward and slightly outward and backward. Petiole nearly twice as long as broad, slightly broader behind than in front, with straight sides; in profile with rather thick peduncle, armed with an acute antero-ventral tooth; node high and acute, its anterior declivity concave, the posterior shorter, more abrupt and feebly convex. Postpetiole subrectangular, a little broader than the petiole and somewhat broader than long, with subparallel sides and distinct anterior angles; in profile with low, rounded node. Gaster rather large, elliptical, with rounded anterior corners. Legs of usual shape.

Mandibles opaque, indistinctly striato-punctate. Clypeus and frontal area shining, sides of the former longitudinally rugulose. Head, thorax, petiole and postpetiole subopaque or glossy; gaster glabrous, legs somewhat less shining. Head very finely longitudinally rugulose and reticulate. Thorax, petiole and postpetiole covered with dense, shallow punctures, thoracic dorsum also very indistinctly and longitudinally rugulose.

Hairs yellow; on the body sparse, erect, obtuse but hardly clavate; on the legs and scapes replaced by delicate appressed pubescence.

Yellow; thorax, petiole and postpetiole pale brown; head, excluding the mandibles, clypeus, cheeks and gula, dark brown; gaster dark brown or blackish above, with the posterior edge and a broad band across the anterior portion of each segment, yellow. Antennal clubs slightly infuscated. Mandibular teeth black.

Described from a number of specimens which I took from a single colony under a stone in Williams Cañon, near Manitou, Colorado, at an altitude of about 7,500 feet.

This species differs from all our other North American species of *Leptothorax* with 12-jointed antennæ (except those of the subgenus *Dichothorax*) in having a distinct mesoepinotal impression. It resembles *L. tricarinatus* Emery in the structure of its clypeus, but its petiole and postpetiole are very different, and the color of the body is much paler. The surface of the head, thorax and pedicel have a peculiar oily appearance which I have not observed in any of our other species of the genus.

6. *Lasius (Acanthomyops) occidentalis*, new species.

Worker. — Length 2.5–3 mm.

Head rectangular, a little longer than broad, with straight posterior border and very feebly convex, subparallel sides. Mandibles with 7 or 8 unequal teeth. Eyes small. Clypeus feebly carinate. Antennal scapes not extending beyond the posterior corners of the head. Funiculus gradually enlarging towards the tip, joints 2 and 8–10 as long as broad, joints 3–7 somewhat broader than long. Thorax of the usual shape in the subgenus. Petiole as high as the epinotum, about half as broad as high, compressed anteroposteriorly, with slightly convex anterior and flat posterior surface; seen from behind rectangular, with the sharp transverse upper border emarginate in the middle. Legs rather long, feebly compressed.

Surface of body shining, finely and rather sparsely punctate, head and clypeus more glabrous. Mandibles striatopunctate.

Pilosity and pubescence golden yellow; the former long, erect, obtuse, moderately abundant, confined to the body; the latter more abundant, covering the body and appendages, but little longer and denser on the gaster than elsewhere.

Yellow; head slightly reddish; borders of clypeus and mandibles dark red; teeth of latter black.

Female. — Length 4.5–5.5 mm.

Head more rectangular than in the worker, distinctly longer than broad, with very straight, parallel sides and feebly excised posterior border. Eyes flattened, just behind the middle of the head. Antennal scapes reaching half way between the eyes and the posterior corners of the head, incrassated at their distal ends; all the joints of the funiculus, except the first and last, somewhat broader than long. Thorax a little more than twice as long as broad, elliptical from above, through the wing insertions but little broader than the head; mesonotum and scutellum flat; epinotum with a short base rounding into the rather steep declivity. Petiole like that of the worker. Gaster longer than the thorax, narrow, with subparallel sides. Legs rather long, somewhat compressed laterally, but not dilated. Tarsi slender, hind metatarsus much shorter than the hind tibia. Wings long (5.5 mm.), discal cell rarely incomplete or absent.

Pilosity, pubescence and sculpture like those of the worker, but the pubescence is longer and on the gaster much denser and more conspicuous, so that the segments appear subopaque.

Color resembling that of the worker, but somewhat more brownish throughout. Wings yellowish hyaline, slightly infuscated towards their bases, with brown veins and stigma.

Male. — Length 2.6–3 mm.

Head, excluding the mandibles, somewhat broader than long, slightly broader behind than in front, with straight posterior border. Eyes hairless, convex, in the middle of the sides of the head. Mandibles edentate. Clypeus broadly rounded in front, convex and subcarinate in the middle. Frontal furrow distinct. Antennæ slender; scapes reaching somewhat beyond the posterior corners of the head; funiculi with cylindrical, subequal joints; first joint feebly swollen, longer than the second. Thorax rather robust, through the wing insertions broader than the head. Declivity of epinotum more sloping than in the female. Petiole like that of the worker but more compressed anteroposteriorly. Gaster elliptical, somewhat flattened dorsoventrally. Discal cell of wings often lacking.

Less shining than the worker, finely and indistinctly punctate.

Pilosity and pubescence grayish, much shorter and sparser than in the worker and female.

Piceous; head and in some specimens also the mandibles and clypeus black, gaster paler; funiculi, tarsi, articulations of legs, genitalia and mouth-parts sordid yellowish. Wings grayish hyaline, scarcely infuscated towards their bases; veins and stigma brown.

Described from numerous specimens of all three phases taken by myself early in July, 1903, from several colonies under stones in various localities about Colorado Springs, Colorado (Prospect Lake, Roswell, Broadmoor and Ute Pass). There is also in my collection a deälated female taken at Pecos, New Mexico, by Professor T. D. A. Cockerell "on a stone at edge of Pecos River, July 30."

This species is most closely related to *L. (A.) interjectus* Mayr, but is much smaller in all its phases. The worker and female are readily distinguished from those of Mayr's species by the much more rectangular and elongate head, shorter antennal scapes, less glabrous body and more abundant pile and pubescence. The male differs from that of *interjectus* in having edentate mandibles, a much less swollen first funicular joint, more finely punctate body, lighter color, less infuscated wings and especially in its smaller size (the male of *interjectus* measures nearly 4 mm.).

7. *Formica adamsi*, new species.

Worker. — Length 3.5–5 mm.

Allied to *F. rufa* L. Head, excluding the mandibles, nearly as broad as long even in the smallest individuals, with straight posterior border, rounded posterior corners and slightly but distinctly convex sides. Eyes large. Mandibles 7–8 toothed. Clypeus prominently carinate, with broadly rounded anterior border, not produced in the middle. Palpi of moderate length. Antennae slender; scapes nearly straight at the base; funicular joints all distinctly longer than broad, the basal somewhat more slender and longer than the apical joints. Pro- and mesonotum moderately rounded, convex, the latter elliptical and nearly twice as long as broad, the former a little broader than long. Epinotum with subequal base and declivity; the former slightly convex, the latter flattened or even slightly concave; the two surfaces in profile passing into each other through a rounded angle. Petiole more than half as broad as the epinotum, in profile with convex anterior and flattened posterior surface and sharp upper border; seen from behind the border is rounded and feebly or not at all produced upward in the middle. Gaster and legs of the usual configuration.

Opaque throughout, only the mandibles, frontal area and sides of the clypeus faintly shining or glossy. Mandibles finely and densely striated. Surface of body densely and indistinctly shagreened.

Hairs and pubescence pale yellow; the latter covering the whole body and appendages, inconspicuous, except on the gaster, but even on this region not sufficiently

dense to conceal the surface sculpture. Hairs short, sparse and obtuse, in several rows on the gastric segments; on the thorax confined to the median portions of the pro- and mesonotum, on the head to the clypeus, front and vertex. The hairs on the mandibles are appressed and pointed, on the palpi short, but numerous and conspicuous. Legs naked, except for a series of pointed bristles on the flexor surfaces of the tibiae and tarsi and a few blunt hairs on the anterior surfaces of the fore coxae.

Sordid brownish-red; the smaller specimens somewhat more yellowish-red. Gaster dark brown, except a large spot at the base of the first segment and the anal region, which are reddish-yellow. A large spot on the pronotum, one on the mesonotum, much of the posterior surface of the head, the distal halves of the antennal funiculi, and in many specimens also the coxae and femora, dark brown or blackish. These dark markings are present in the largest as well as in the smallest workers. Teeth of mandibles black.

Described from numerous specimens taken from a single colony on Isle Royale, Michigan, and received from Dr. C. C. Adams. A dozen workers taken by myself on Pikes Peak, Colorado, near timber line, at an altitude of 10,500 to 11,000 feet, differ from the Isle Royale specimens only in having the frontal area smooth and shining, the middle of the petiolar border produced upward as a distinct, blunt point, and in the less extensive infuscation of the head, pro- and mesonotum. These specimens may be regarded as representing a distinct variety, which may be called *alpina* var. nov. Both this and the typical *adamisi* may be distinguished from our other North American Formicæ of the *rufa* group by their small size, opaque surface and peculiar coloration and pilosity. The following collector's note accompanying the Isle Royale specimens adds some ethological characters which are not observed in any of the other small forms of the *rufa* group known to me: "The nests of this ant are one of the most conspicuous features of the drier tamarack swamps. They are rounded-conical in shape, 3-6 cm. high or even larger and with a diameter at the base about equalling the height. They are composed within of *Sphagnum*, but as would be expected with such material, without any definite system of galleries. The outer surface is thickly covered with leaves of *Cassandra*, probably to prevent loss of moisture by evaporation from the interior. They are frequently placed under or near a bush of *Cassandra*, but the same covering is used even if no *Cassandra* is near." (H. A. Gleason.)

✓ 8. *Formica comata*, new species.

Worker. — Length 4.5-7 mm.

Allied to *F. ciliata* Mayr. Head, excluding the mandibles, as broad as long, broader behind than in front, with rounded posterior corners, feebly excavated posterior margin and slightly convex sides. Eyes large. Mandibles 7-toothed. Cly-

peus carinate, with broadly rounded, entire anterior border, not projecting in the middle. Frontal area subsemicircular, broader than long. Antennal scapes straight at the base, slightly enlarging distally; funicular joints 1-4 somewhat more slender than the remaining joints. Thorax as usual in the *rufa* group of *Formica*, epinotum angular in profile, with subequal base and declivity, the former horizontal and slightly convex, the latter sloping and slightly concave. Petiole as high as the epinotum, in profile attenuated above, with rather sharp border; seen from behind broadly rounded or sometimes produced upward in the middle in the form of a blunt point; anterior surface convex, posterior surface flat. Gaster rather large, legs of the usual configuration.

Subopaque, slightly glossy; corners of head somewhat shining; whole body finely and densely shagreened; frontal area, bases of mandibles and corners of clypeus glabrous; mandibles finely and densely striated.

Hairs yellow, short and suberect, sparse on the head, thorax and petiole, more abundant and obtuse on the gaster, absent on the antennal scapes, present in a single row on the flexor surfaces of the femora and tibiæ, scattered on the fore coxæ, long on the venter and tip of gaster. Pubescence long, grayish, sparse on the head, thorax and petiole, dense on the gaster, where it completely conceals the surface; somewhat conspicuous on the legs. Eyes hairless.

Red; gaster blackish-brown except a large spot at the base and the anal region, which are reddish or yellowish. Mandibles, corners of clypeus, antennæ and legs reddish-brown; bases of scapes often paler; pro- and mesonotum each with a fuscous spot, pale in the largest, somewhat larger and darker in the smallest workers; apical half of petiolar node more or less infuscated. Small workers also with brown or black spots on the clypeus, front, occiput and epinotum and with the coxæ more or less infuscated. Mandibular teeth black.

Female. — Length 7.5-8 mm.

Resembling the female *ciliata* in form. Whole body much more shining than that of the worker as the shagreening of its surface is much more delicate; scutellum and metanotum glabrous. Pubescence like that of the worker, but longer; pilosity grayish, resembling that of the female *ciliata* but less dense, and the very long hairs on the gaster are slender, less appressed, rather straight and not recurved at their tips. Color of the body dull brownish-yellow, gaster blackish-brown, except its base and anal region. Mandibles, funiculi, corners of clypeus, anterior borders of cheeks, posterior border of pronotum, a large anteromedian and two parapsidal blotches on the mesonotum, dull brown; scutellum and metanotum chestnut-brown. Wings long (9 mm.), uniformly smoky hyaline, with brown veins and darker stigma.

Male. — Length 8-8.5 mm.

Head decidedly broader than long, narrowed in the region of the cheeks, which are short and flat; posterior border of head straight, posterior corners broadly rounded. Eyes large, suboblong. Maxillary palpi 5-jointed. Mandibles 4-toothed. Clypeus convex, subcarinate, with entire, slightly reflected anterior border. Thorax and gaster of the usual shape, the former distinctly broader than the head. Petiole broad and low, with thick, rounded, transverse upper border.

Body subopaque; pleuræ, scutellum, metanotum and gaster more shining. Mandibles striatopunctate. Head and thorax very finely and densely punctate, gaster shagreened, with rather coarse, scattered, piligerous punctures on its upper surface.

Hairs and pubescence grayish, more abundant than in the worker; the hairs very

long on the epinotum, border of petiole, basal gastric segment and venter, somewhat shorter on the clypeus and pronotum and still shorter on the upper surface of the gaster. Eyes hairless.

Black; borders of mandibles, tibiæ, tarsi and articulations of legs brownish, or in some specimens yellowish. Genitalia sordid yellow. Wings like those of the female.

Described from a dozen workers, five females and six males taken from a single colony at Manitou, Colorado (July 26, 1906). I have taken this species (four females and several workers) also in Red Rock Cañon, near Colorado Springs in the same state (July 28, 1903). *F. comata* may represent a hybrid between *F. ciliata* and *F. rufa obscuripes* Forel or *F. rufa rubiginosa* Emery. The female, though it combines certain characters of all these forms, is very distinct on account of its peculiar coloration and pilosity. It is much more difficult to distinguish the workers. The legs are paler, the body more hairy and the abdomen darker than in the *ciliata* worker, and the larger workers of the latter species lack the dark spots on the thorax. In the worker *obscuripes* and *rubiginosa* the hairs on the head and thorax are much more abundant and more erect than in *ciliata* and *comata* and the infuscation of *obscuripes* workers of all sizes is much more pronounced and extensive. The male of *comata* differs from that of *ciliata* and *obscuripes* in having dentate mandibles and somewhat paler wings. The nest of *comata* is not a mound like that of *obscuripes*, but is excavated, like that of *ciliata*, under stones and these are rather heavily banked or even covered with vegetable detritus.

✓ 9. *Formica crinita*, new species.

Worker. — Length 4–6.5 mm.

Resembling the worker of the preceding species but averaging somewhat smaller. Head, excluding the mandibles, a little longer than broad, even in the largest workers; narrower in front than behind, with nearly straight posterior and lateral margins. Eyes rather large. Mandibles 7–8 toothed. Clypeus carinate, with entire anterior border, slightly projecting in the middle. Frontal furrow distinct. Antennæ, thorax and petiole as in *comata*. Palpi rather short. Gaster and legs of the usual shape.

Body subopaque, very finely shagreened; bases of mandibles, frontal area and corners of clypeus glabrous. Mandibles and clypeus finely, longitudinally striated.

Hairs yellow; absent on the head, thorax, petiole and appendages, blunt and scattered on the gaster, pointed on the clypeus, mandibles and venter. Pubescence yellowish and very short, inconspicuous on the head, thorax and petiole, somewhat longer on the legs and gaster; on the latter rather dense and nearly concealing the surface. Eyes hairless.

Yellowish-red; gaster dark reddish-brown, except the anal region and a spot at the base of the first segment, which are yellowish; tips of antennal funiculi, middle

portions of femora and tibiæ brownish or reddish. The smallest workers have the upper surface of the thorax, especially the pro- and mesonotum, somewhat infuscated. Mandibular teeth black.

Female. — Length 6.5–7 mm.

Resembling the female of *ciliata*. Body shining throughout, very finely shagreened, without pubescence. Hairs very long, yellow, curled or hooked at their tips, confined to the clypeus, gaster and ventral surface of the petiole; on the gaster appressed and arranged in two rows near the posterior border of each segment. Body and appendages yellow; teeth of mandibles and anterior edge of clypeus black; scutellum, metanotum, an antero-median and two parapsidal blotches on the mesonotum, anterior borders of cheeks and a narrow band parallel with the posterior edge of each gastric segment, brown. Antennal funiculi infuscated towards their tips. Wings grayish hyaline, with pale brown veins and darker brown stigma.

Described from six mature and five callow females and eighteen workers taken by myself from a single nest near Boulder, Colorado (July 29, 1906). This species is, perhaps, a hybrid between *F. oreas* Wheeler and *F. ciliata* Mayr, but the worker differs from those of both these species in the absence of hairs on the head, thorax and petiole, and the female has much fewer hairs and these are confined to the clypeus and abdomen. The hairs are very easily rubbed off in both workers and females, but the long series of the former and the callows of the latter show that they cannot be more abundant than described above. The colony from which the specimens were taken was very populous. Its nest resembled very closely those of *ciliata*, *comata* and *oreas* which I have examined in Colorado. It was under several contiguous stones, banked with vegetable detritus and in the immediate neighborhood of flourishing colonies of *F. ciliata* and *rufa obscuripes*.

10. *Camponotus schaefferi*, new species.

Worker major. — Length 9–10 mm.

Head convex above, flat below, as broad as long, narrower in front than behind, with broadly and feebly excised posterior border and very convex sides. Cheeks with a transverse impression. Mandibles rather small, very convex, 5–6-toothed. Clypeus subrectangular, ecarinate, flat, longer than broad, a little broader in front than behind, its anterior border with a small blunt tooth on each side and distinctly excised in the middle. Antennal scapes reaching to the posterior corners of the head, not compressed. Eyes rather large, flat, elliptical. Frontal area indistinct. Vertex with a small pit in the position occupied by the anterior ocellus in the female, and two smaller pits on each side further back. Thorax narrowed behind and laterally compressed, its dorsum in profile rather evenly arcuate, with a distinct metanotal sclerite. Epinotum subrectangular in profile, with subequal base and declivity separated by a rounded angle, the base being straight, the declivity slightly concave. Petiole narrower than the epinotum, with well-developed node, which is erect, very

convex in front, flat behind and has a sharp border; seen from behind the border is rounded or slightly and bluntly acuminate in the middle. Gaster as usual. Legs rather long, femora somewhat enlarged.

Shining throughout and very finely and indistinctly shagreened; whole upper surface of head with scattered punctures, which may be slightly elongated on the occiput. Mandibles coarsely and densely punctate, scapes with coarse but scattered punctures. Mesonotum with a few piligerous foveole.

Hairs golden yellow, moderately long, suberect, sparse on all parts of the body, as long on the gula as on the upper surface of the head; present also on the fore coxae, flexor surfaces of the fore femora and knees. Tibiae with a row of short, stiff hairs on their flexor surfaces. Scape with a few scattered suberect hairs on their anterior surfaces and tips; funicular joints tipped with short hairs. Pubescence sparse, absent, except on the funiculi, coxae and tibiae.

Rich yellowish-red; mandibles, clypeus and anterior portions of head, antennal scapes and sometimes also the middle and hind tibiae, darker red. Mandibular teeth, edges of clypeus and frontal carinae black.

Worker media. — Length 8-9.5 mm.

Resembling the worker major except that the head is smaller and the cheeks less swollen and lacking the transverse impressions. The antennal scapes are longer and the petiolar node is inclined forward and more convex on its anterior surface. Punctures absent or very faint on the head.

Worker minima. — Length, 6-7.5 mm.

Head longer than broad, with parallel sides and rounded posterior border. Mandibles 5-toothed. Clypeus broader than long, feebly carinate, without teeth and with a very faint excision in the middle of its anterior border. Antennal scapes extending about half their length beyond the posterior corners of the head. Frontal area obsolete. Petiole low and thick, with rather blunt upper border. Mandibles less coarsely punctate than in the worker major; head impunctate, glabrous. Pilosity like that of the major and media; body and appendages of a paler color and more yellow throughout. Mandibles, antennæ and tibiae reddish.

Female. — Length, 11-11.5 mm.

Resembling the worker major, but head more elongate, with longer, straight cheeks and clypeus about as broad as long, subhexagonal. Scape reaching about $\frac{1}{4}$ their length beyond the posterior corners of the head. Mesonotum flattened, scarcely broader than the head. Petiole high, antero-posteriorly compressed, with feebly convex anterior surface and acute upper border. In sculpture, pilosity and color much like the worker major. Head scarcely punctate on its upper surface. Wings long (12 mm.), yellowish hyaline, more grayish towards their tips, with yellow veins and stigma.

Described from a media and minima taken by Mr. C. Schaeffer at Palmerlee, Cochise County, Arizona, a winged female taken by Mr. E. J. Oslar in the Huachuca Mountains, Arizona (Aug. 28, 1903), and a long series of females and workers of all sizes collected by Mr. C. R. Biederman in Carr Cañon, in the same mountain range (March 27, 1907).

This handsome species belongs to the *fallax* (*marginatus*) group of *Camponoti* and is closely related to *C. texanus* Wheeler and *C. sayi* Emery. It differs from both of these species in its uniform yellowish-red color, somewhat smoother surface, narrower and less prominently dentate clypeus in the worker major, and from *sayi* also in its larger size. It might, perhaps, be regarded as a subspecies of *texanus*. The specimens received from Mr. Biederman were found in a "nest partly in the ground and partly in rotten wood, six inches deep, at an altitude of 5,000 feet."

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

ANNUAL MEETING OF JANUARY 5, 1909.

Held at the American Museum of Natural History. President C. W. Leng in the chair, with seventeen members present.

The following report was read by the Treasurer :

Society's Bal. January 1, 1909.....	\$916.86
Received during 1908 for dues and interest.....	206.24
Disbursements.....	132.09
Balance.....	\$991.01
Journal account Bal. Jan. 1, 1909.....	\$142.11
Rec'd from subscriptions and sales.....	444.60
Disbursements	494.96
Balance.....	91.75
Total Balance.....	\$1082.76

Mr. E. D. Harris, chairman of the auditing committee, reported on examination and endorsement of the report and commended the watchfulness and economy of the treasurer.

The librarian reported the receipt of the following exchanges :

Zeitschr. f. Wiss. Insekten-biologie, IV, Nos. 10-11.

Canadian Entomol., XL, No. 12.

Wiener. Entom. Zeitung., XXVII, Nos. 9 and 10.

Descriptions of Some New Mosquitoes from Tropical America, by H. G. Dyar and F. Knab.

A Generic Revision of American Moths of the family Ecphoridæ, by A. Busck.

A Revision of Some Species of Noctuidæ, by J. B. Smith.

Descriptions of New Species of North American Crambid Moths, by W. D. Kearnott.

Two New Species of Neotropical Orthoptera of the family Acrididæ, by J. A. G. Rehn.

Deutsche Entomol. Zeitschr., 1908, No. 6.

Jahresheft d. Vereins f. Schlesische Insektenkunde, 1908, No. 33.

Dr. E. B. Southwick, chairman of the committee, read the nominations of officers as follows:

President — G. W. Leng.

Vice President — E. B. Southwick.

Treasurer — W. T. Davis.

Rec. and Corr. Sec. — H. G. Barber.

Librarian — C. Schaeffer.

Delegate to Academy of Sciences — C. H. Roberts.

Executive Committee — G. P. Engelhardt, R. C. Osborn, G. W. J. Angell, C. F. Groth, J. L. Zabriskie.

Publication Committee — Wm. M. Wheeler, C. Schaeffer, E. P. Felt, F. G. Love.

Auditing Committee — E. D. Harris, E. B. Southwick, E. L. Dickerson.

Field Committee — W. T. Davis, R. P. Dow.

On motion of Mr. Pollard, duly seconded, the secretary was instructed to cast a single ballot for the list of officers as read.

Mr. Engelhardt exhibited a collection of bees which he had taken in the vicinity of Olas de Moka, Dept. of Sosola, Guatemala, in September, 1908. Most of the material had been collected at an altitude of about 300 feet. He spoke of the abundance of bees swarming over the mass of tree blossoms or hanging vines many feet above the ground, and thus difficult to capture. He found a number of species of boring and carpenter bees in the woodwork of various outbuildings on the plantation. Several colonies of stingless bees were also taken.

Mr. Osborn, under the title of "A Review of Calvert's Odonata of the Biologia-Centrali-Americana" spoke concerning the excellency of this great work. His review is published in the body of the Journal.

Dr. Charles L. Pollard read a paper entitled "Notes on Hybrids between *Samia cynthia* and *Callosamia promethea*." He first gave a summary of previous observations as follows: (1) Cross between female *Cynthia* and male *Promethea*. Miss Caroline G. Soule obtained only two fertile eggs from this cross. The larvae were typical *Cynthia* in practically every respect. Mr. Joutel, working with more abundant material, succeeded in raising a number of larvae, which were typical *Cynthia*, and constructed *Cynthia*-like cocoons. (2) Cross between female *Promethea* and male *Cynthia*. Both observers raised broods from the cross, and both obtained larvae partaking of the characters of the two parents. Miss Soule's brood, however, showed wide individual variation, while Mr. Joutel's varied only in respect to moults, the individuals at any given stage being practically alike. Although he had seen no published description by Mr. Joutel of the moths resulting from his crosses, Mr. Pollard had heard that interesting specimens were obtained by Mr. Joutel from female *Promethea* and male *Cynthia*. Both of these observers secured their hybrids by natural methods, but he had succeeded at no time in obtaining a natural cross. Crosses were therefore made artificially, each moth being held by the wings until union was effected. Of all these pairings, however, only one resulted in fertile eggs. This was a cross between female *Cynthia* and male *Promethea* on June 22, 1908. The female laid 326 eggs. Of these on July 2, 102 eggs hatched and no more thereafter. The young larvae, as well as the mature larvae examined later in detail, showed no constant point of difference from the typical *Cynthia* and this fact is in agreement with

previous observations. Many of the larvae died during development, but 47 of the original brood survived to form cocoons. He was fortunate in having one male and two females emerge on August 18 and on August 20, three more females. The hybrid moths were *Cynthia*s in every respect and if mixed with pure breed individuals could not be separated. The male mated naturally with one of the females, which oviposited normally, and these hybrids eggs of the second generation hatched on September 3. Of the 196 eggs laid practically all were fertile. Upon hatching it was noticed that these larvae were smaller than the type, and showed more variation in color during their development. Cocoons were obtained of 39 larvae between October 8 and 21. In conclusion Mr. Pollard remarked that if there was any tendency in the hybrid to follow Mendelian principles of inheritance, the moths of this generation emerging next spring should display some interesting results. Both typical and hybrid forms were exhibited.

Mr. Beutenmüller exhibited types of the following fossil Diptera from Florissant, Colorado, described by Professor T. D. A. Cockerell: *Tabanus parahippi*, *Tabanus hipparionis*, *Chilosia miocenica*, *Psilocephala hypogaea* and *Lithocosmos coquilletti*. Mr. Beutenmüller also exhibited some Orthoptera collected by Mr. Webber in Sumatra, and presented to the American Museum. Among these were sixteen new species and a number of very curious mimetic forms.

Society adjourned.

MEETING OF JANUARY 19, 1909.

Held at the American Museum of Natural History. President C. W. Leng in the chair and fourteen members present.

The librarian reported the receipt of the following exchanges:

Bulletin Societa Entomol. Italiana, XXXIX, Nos. 1-4.

Canadian Entomol., XLI, No. 1.

Insect World, XII, Nos. 11 and 12.

Revista do Museu Paulista, Vol. VII.

Zeitsch. f. Wiss. Insekten-biologie, IV, No. 12.

Tijdschrift Entomol., 1908, Nos. 3 and 4.

Berliner Entomol. Zeitschr., LIII, No. 2.

Bull. 216 N. J. Agric. Exp. Sta.

Proc. Cal. Acad. Sci., 4th Ser., III, pp. 41-48.

Mr. Dickerson made a few remarks on the house mosquito, *Culex pipiens*, and commented on the bulletin concerning the insect by Professor J. B. Smith recently issued by the N. J. Experiment Station. He said that while the salt meadows in this section of New Jersey had been drained, and as a result, the salt marsh mosquitoes, *Culex sollicitans* and *cantator*, practically suppressed, the unusual weather conditions last spring had permitted the house mosquito to become unusually abundant and troublesome. Where the authorities had oiled the sewer basins and taken other precautions, there had been little trouble, and it had been shown that although this insect had to be considered in our campaign, it could be readily controlled if this sort of work was carried on by the Board of Health.

Mr. Dickerson also exhibited a series of specimens of *Satyrus alope*, var. *mari-tima*, varying from the typical form to that closely resembling the form *nephela* which was collected at one time at Chester, N. J. Messrs. Sleight and Engelhardt stated

that they had taken these forms in the vicinity of Lake Hopatcong, N. J. Mr. Beutenmuller exhibited the species of *Satyrus* in the museum collection.

Mr. Engelhardt exhibited some miscellaneous Hymenoptera which he had collected in Guatemala, including species of *Pepsis* and *Polybia* and several species of ants. Of *Pepsis* he had taken a number of males but no females at light. A nest of *Polybia*, just started, was shown as well as one which had been building for two weeks. Mr. Engelhardt observed that these insects while building made a layer of cells a day, covered them towards night, and the following day destroyed the covering and added another layer of cells. The leaf-cutting ants, *Atta* sp., were observed in considerable numbers marching in paths which in places were covered. They were so destructive in gardens that it was impossible to raise flowers. Nests of these insects were found to be very large. Ants were also noted on a species of *Acacia* and the thorns which they inhabited were shown. All of the ants observed were unpleasant to handle because of their sting.

Dr. Dow spoke of the habit of *Eudryas unio*. In a swamp on Long Island many hundred larvae of the insect had been observed upon the swamp Loosestrife. When full-grown, they had pupated near dead and decaying wood, some species of which, containing many pupæ, were exhibited. Very few pupæ were found parasitized but about 50 were attacked by a fungus.

Mr. Engelhardt said he had obtained many parasites, both Hymenopteran and Dipterous, and had noted that the pupæ were sometimes attacked by a bacterial disease.

Mr. Olsen reported the capture of two specimens of *Carabus nemoralis* at Winfield, Long Island, and a specimen of *Dendroides concolor* at North Beach, Long Island.

Mr. Angell said that *Carabus nemoralis*, which is a European insect, was first taken some twenty years ago by Mr. Clarence Riker, of Maplewood, N. J. Later it was found in some numbers under an old board walk at Cambridge, Mass., and last year he had reported specimens from the Bronx, New York City. The present captures seemed to indicate that the insect was becoming established, although these may have been introduced with some imported plants, as the locality is not far from Floral Park.

Dr. Pollard exhibited some exotic Saturniid moths, including a pair of *Tagara pallida*, which he had just acquired.

Mr. Beutenmüller exhibited some fine examples of exotic Mantidæ.

Mr. Davis showed specimens of *Orchelimum pulchellum*, which he had recently described. At Dennisville, N. J., he stated he had found a specimen in a swamp while searching at night with a lantern. The following night another was captured, and the characteristic song and color were noted. Both of these specimens were males. He had also captured a male and female at Jamesburg, N. J., somewhat later.

Meeting adjourned.

MEETING OF FEBRUARY 2, 1909.

Held at the American Museum of Natural History. President C. W. Leng in the chair, with fifteen members present.

Mr. Dow presented the resignation of Mr. F. M. Schott, which was accepted with regret by the Society.

Mr. W. D. Kearfoot presented a request for a grant from the research fund of the N. Y. Academy of Sciences to carry on the work of publishing a monograph of the Tineid Moths of the world and requested the endorsement of the Society. On motion the request was endorsed.

Dr. R. C. Osburn gave an illustrated lecture on the copulatory organs of dragonflies, with an account of the egg-laying habits. Many interesting slides were exhibited.

Meeting adjourned.

MEETING OF FEBRUARY 16, 1909.

Held at the American Museum of Natural History. President C. W. Leng in the chair with seventeen members and five visitors present.

The librarian reported the receipt of the following exchanges received since January 19:

Entomol. Tidjkrift., Vol. XXIX, Nos. 1-4.

Univ. of Montana, Bulletins Nos. 50, 51 and 52.

Canad. Entom., XLI, No. 2.

Philos. Soc. Washington, Bull. XV, pp. 103-126.

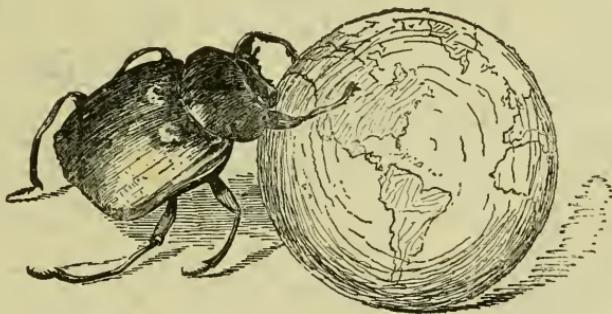
Proc. Amer. Philos. Soc., XLVII, No. 190.

Dr. Zabriskie gave his fourth paper "On the Microscopical Examination of External Structures of Heteropterous Insects." It was illustrated by lantern slides from drawings made by himself to show certain structural peculiarities of *Chelinidea vittigera*, *Catorhintha guttula* and *Niesthrea sideæ* of the family Coreidæ. The following illustrations were shown and commented upon: The antennæ of the species showing differences in shape and diameter of segments and the supplementary joint appearing as a cup-like structure between the third and fourth segments; side view of the head showing the two spines, one on either side of the groove near the base of the second segment of the rostrum, the use of which is uncertain; the peculiar arrangement of hooks and clasps which hold the fore and hind wings together when spread; the sensory hairs on the pygidium of the flea, the under side of the squash bug and the cerci of the cricket.

Meeting adjourned.

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OF THE
NEW YORK
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Devoted to Entomology in General.



SEPTEMBER, 1909.

Edited by WILLIAM MORTON WHEELER.

Publication Committee.

E. P. FELT.

CHARLES SCHAEFFER.

E. G. LOVE.

W. M. WHEELER.

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No. 3.

THE CAMP AT LAKEHURST.

BY WM. T. DAVIS.

The subject of a July outing to be centered about the national holiday was several times discussed at the meetings of that society of entomologists which bears a dual name, and meets oft times in New York, Brooklyn and out in the country. It was finally decided that we camp near Lakehurst, N. J., especially as Mr. Charles E. Sleight was willing to loan six tents for the occasion, which when supplied with bed-ticks stuffed with pine-needles, blankets and mosquito netting, were guaranteed to offer the comforts of home. About a large spreading chestnut tree that some hopeful person had imported into the pine-barrens years ago, and planted on a little farm now abandoned, we pitched our tents, and while we worked we kept an eye open for the ever-present insects.

When we were raking pine-needles for beds, we uncovered a *Pasimachus*, and indeed this is a very good way to discover these beetles, as we have seen several others thus found while raking among the pines of Long Island. When busy with the tents we saw the tag end of a small army of the shining slave-making ant (*Polyergus lucidus*) just returning from a raid on some unfortunate colony. It may be of interest to mention that we have known of a nest of these slave makers, resident at Lakehurst under two old railroad ties lying close together, since July, 1907. They only occupy part of the space and have *Formica schaufussi* slaves. Under the same old ties is a nest of *Formica difficilis*. Both colonies are still in a flourishing condition and apparently get along harmoniously.

The camp was ready on the evening of July 2, and eighteen members attended,* some arriving on the following day. A long table had been arranged beneath the shade of the spreading chestnut about which our interest centered, not only at meal time, but when the lanterns were lit, for then many insects were attracted. Prof. Smith was busy identifying mosquitoes provided principally by Dr. Lutz, for the evening was cool and *Culex* could only be caught with bait to its liking. But if the evening of the second was cool, the evenings of the third, fourth and fifth of July were frigid by comparison. The mosquitoes forgot us entirely, and we sought the "tent flies" in which we wrapped ourselves, and we were gratefully warmed by the log fire that we built on the evening of the celebration of our national holiday.

While the nights were cold the days were perfectly clear, and warm enough to coax forth the butterflies and other insects. Thus we captured several *Pamphila attalus* and *Pamphila arogos*, both species being found in damp places, not far from the haunts of *Neonympha phocion* and *Chrysophanus epixanthe*.

We collected several *Cicindela consentanea*, which die out in mid-summer about the time that *Cicindela abdominalis* begins to be common. There is often a great variation in size in these latter insects, as is also the case in *C. punctulata*. At Lakehurst there are very dark-colored specimens of *Cicindela generosa*, some of them with but narrow markings approaching a *vulgaris* in pattern. We have not, however, found the bright purplish-colored examples occurring in parts of Staten Island and elsewhere.

On the flowers of the chestnut tree that shaded our table, *Leptura vagans* abounded, varying in color from all black to elytra all brown. On the post-oaks were *Goes debilis*, and on the black-jack oaks, *Goes pulverulentus* and *Goes tessellata*. *Elaphidion unicolor*, *Cacoplia pulchra*, *Oberea gracilis*, *Oberea ruficollis* and *Schœnicus puberulus* were also found. A considerable number of Clerids and Buprestids of interest were captured by Messrs. Schaeffer and Bischoff, and Mr. Barber beat from a young pine *Buprestis ultramarina*, a late record for this species.

With the beetles that dropped into our umbrellas, there were also

* Those in attendance were E. A. Bischoff, Wm. T. Davis, Jacob Doll, R. P. Dow, H. G. Barber, Geo. P. Engelhardt, Geo. Franck, W. D. Kearnott and Son, J. J. Levison, Dr. F. E. Lutz, C. L. Pollard, Roland McIlvaine, C. E. Olsen, Chas. Schaeffer, Chas. E. Sleight, Prof. John B. Smith and S. C. Wheat.

some of those curious tree-hoppers which inhabit the pine-barrens, like the ornate *Heliria cristata* to be found on the post-oaks, and *Glassonotus acuminatus* from the black-jacks. There were likewise *Thelia univitta*, *Smilia camelus*, and the "cow-hopper" *Centruchoides perdita*. *Nezara pennsylvanica*, *Largus succinctus*, *Chariesterus anten-nator*, *Brochymena annulata* and *Apiomerus crassipes* were also collected. On three separate occasions the writer has found this last mentioned bug perched on manure, as if attracted by the flies it hoped to catch in that vicinity. *Aulacostethus marmoratus* and *Tetyra bipunctata* were found, the latter in considerable numbers considering the lateness of the season. It is more common in spring and fall; in July, as Mr. Barber pointed out, chiefly females are to be found. They are perched commonly on the green cones of the pitch-pine, where also some young, no doubt of this species, were found by Mr. Sleight.

The little Cicada, *Tettigea hieroglyphica* was in great numbers, and we noticed that they had come forth earlier in those places that had been recently burned over. Several of the females had just emerged and had not attained their full colors. Mr. Engelhardt found a few *Cicada lyricea* pupæ skins, and two of the insects just hatching, on the old orchard trees about our camp. We did not hear the insects singing.

Ant-lions came to lights, and we also found them in the day time. The following four species were collected: *Ptynx appendiculatus*, *As-calaphus quadripunctatus*, *Myrmeleon crudelis* and *Cryptoleon nebulo-sum*. *Mantispa brunnea* was in considerable numbers. These insects have an odor like slippery-elm, and may occasionally, with the proper atmospheric conditions, be detected thereby. *Mantispa interrupta* was also collected, but in less numbers. We found them mostly on the post-oaks, but they are to be met with on all the trees.

Of dragon flies we collected one old *Anax junius*, in which the central portions of the wings had become much clouded. Also the far from common *Progomphus obscurus*, which is to be found in July at Lakehurst flying up and down several of the ditches near the railroad.

Four species of *Chrysops* flies attacked us, and many Tabanids the tame cow, that would lie patiently on the ground while Mr. Franck removed her tormentors. Through his agency they will next assail some hard working college student of our favorite science.

At night, when it was not too cold, we sugared, the writer using

molasses flavored with fusel oil. It is very easy to carry a small bottle of fusel oil into the country, where molasses can usually be procured at the village store. Nothing has a more groggy odor, and explanations are to be made in prohibition communities and to one's unentomological friends.

At sugar, Mr. Pollard and the writer each caught *Catocala coccinata*, *C. similis* and *C. gracilis*. The last two were also collected on the tree trunks in the day time. Hardly any other moth came to the sugar, but the long-legged Orthopterous insect, *Atlanticus dorsalis*, was in attendance. Both males and females were thus attracted.

In the way of insect architecture we found several sheds made by *Cremastogaster pilosa* over the Coccidæ on the twigs of the pitch pine, and a great many of the tubes made with silk and sand by the larvæ of *Prionopteryx nebulifera*. These usually led from the underground chamber, where the larva was to be found, up the stem of a huckleberry bush to the foliage. Sometimes the food plant was sand myrtle (*Leiophyllum buxifolium*), and Dr. Lutz found one instance where the caterpillar had carried many of the sand myrtle leaves into its burrow. Mr. Daecke has an account of these sand-tubes and their builder in *Entomological News* for January, 1905. Mr. Kearfott has also made observations upon them.

Mr. Doll collected many caterpillars, Mr. Dow many beetles, Mr. Olsen a goodly number of bugs, and no doubt there were many conspicuous finds here unnoticed. And as to all of the little things who can say, for the entomologist always dwells in the land of the unknown.

A NEW HONEY ANT FROM CALIFORNIA.

BY WILLIAM MORTON WHEELER,

BOSTON, MASS.

Myrmecocystus lugubris, new species.

Worker. — Length 2.5-4 mm.

Head distinctly longer than broad, subrectangular, very nearly as broad in front as behind, with straight subparallel sides and rounded posterior border. Eyes somewhat more than one fifth as long as the sides of the head, more convex and larger than in *M. melliger* Forel, smaller than in *M. mexicanus* Wesmael. Ocelli very small. Mandibles 7-toothed, the apical tooth longest and curved. Clypeus convex but not carinate, with broadly and evenly rounded, but not projecting, anterior border. Frontal area obsolescent. Maxillary palpi very long and slender, their terminal joint not

more than half as long as the penultimate. Antennæ slender. Thorax as in *M. melliger*, pronotum nearly as broad as long; mesoepinotal depression very shallow and rather short in profile; epinotum rounded, with subequal base and declivity. Petiole less than half as broad as the epinotum, slightly inclined forward, much more compressed anteroposteriorly and with much sharper border than in *melliger* and *mexicanus* or any of their subspecies or varieties. The posterior surface of the petiole is flat, the anterior feebly convex, the border, seen from behind, very faintly impressed in the middle. Gaster rather large, capable of considerable distension. Legs long and slender.

Mandibles subopaque, coarsely striated. Remainder of body shining, very finely and obscurely punctate; head more glabrous than the thorax and gaster.

Hairs and pubescence white, rather long; the former erect on the body and legs, but not on the antennal scapes; clypeal and gular ammochæte long and conspicuous. The hairs on the legs are much shorter than those on the body, the pubescence on the head sparser than on the thorax and gaster.

Body black; clypeus, antennæ, palpi, legs and intersegmental constrictions of gaster piceous or fuscous; mandibles and mouth sordid yellow.

Described from fifteen specimens taken by Mr. J. Chester Bradley at Otis, in the Mojave Desert, California (Dec. 16, 1908). The two largest workers (measuring 4 mm.) have the gaster greatly distended and are evidently in a semireplete condition, showing that this species has the honey-storing habits of *M. mexicanus* and the typical *M. melliger*. The new species is remarkable on account of its diminutive size, the absence of erect hairs on the antennal scapes, the deep coloration of the body and the peculiar structure of the petiole, which is not thick and blunt in profile as in *M. melliger* or subcuneate as in *M. mexicanus*, but much compressed anteroposteriorly as in certain species of *Formica* and *Camponotus*.

FOUR NEW CERAMBYCIDÆ.

By CHARLES SCHAEFFER,

BROOKLYN, N. Y.

Atylostagma glabrum, new species.

Pale yellowish-testaceous, upper surface without pubescence, except a narrow transverse basal line of thorax and scutellum and a few scattered erect hairs on head, sides of prothorax and base of elytra. Head coarsely, not densely punctate. Eyes coarsely granulated, lower lobe extending slightly in front of antennal tubercle, the latter widely separated. Antennæ (female) extending to about apical fourth of elytra; first joint slightly clavate, about as long as second and third together; joints serrate and bispinose, from the third gradually increasing in length, twelfth joint small, about

half as long as the eleventh. Thorax scarcely wider than long; sides without spines or tubercles, nearly parallel to about middle, then obliquely narrowing to the basal constriction; surface coarsely, densely confluently punctate, except a median basal space, extending to about middle and free from punctures; the feeble basal impressed line pubescent with fine, short, cinereous hairs. Elytra about four times as long as the thorax; sides gradually narrowing to apex from about middle; apices bispinose, the outer spine longer than the sutural; surface sparsely and not coarsely punctate, the punctures finer and sparser towards apex, near base a few scattered erect pale hairs. Anterior coxal cavities open behind, feebly angulated externally; intermediate coxal cavities nearly closed externally. Posterior femora with a short, acute spine at apex. Abdomen darker, pubescent at sides, nearly smooth at middle and very sparsely punctate. Length 26 mm.

Tucson, Arizona, a single female collected by E. A. Oslar and generously given to me by my friend Mr. Chas. W. Leng.

Allied to *Axestinus* from which the nearly closed middle coxal cavities and the scarcely exteriorly angulated front coxal cavities will distinguish *Atylostagma*.

The rather short description of the only known species, *A. politum* White, fits the Arizona specimen very closely, and it is only on account of the distinct bispinose antennal joints that I have given it a new name. The antennae of *politum* are spined on the outside from the third joint and dilated on the inside so as to appear serrated.

***Brothyulus subpubescens*, new species.**

Brown, pubescence of upper surface not variegated, uniform and inconspicuous. Head short, coarsely but not densely punctate; interantennal impression moderate; frontal impression deep. Antennae reaching to apical fourth; fourth joint about three fourths as long as the third; the third joint slightly shorter than the fifth; the following joints gradually decreasing in width; very finely and not densely pubescent. Thorax longer than wide; sides very feebly arcuate, lateral tubercle large, but not prominent; basal impression broad, but rather shallow; disk without callosities, but with a narrow longitudinal impression; surface granulate, pubescence rather sparse, consisting of short cinereous appressed hairs with longer, semi-erect hairs intermixed. Elytra about two and a half times as long as wide at base; apices separately rounded; surface not coarsely punctate, punctures finer and almost obsolete towards apex, granulate near base; pubescence short, appressed and not very dense, permitting the surface color of elytra to be plainly seen, intermixed with longer erect or semi-erect hairs. Metasternum and abdomen finely and densely punctate, with some longer punctures intermixed; pubescence short, not very dense and appressed, intermixed with some longer, semi-erect hairs. Length 14 mm.

Arizona, one specimen, which I owe to the kindness of Mr. Chas. Palm.

This species is not exactly congeneric with *Brothyulus*, but the want of sufficient material for comparison induces me to leave it in this genus for the present.

Elaphidion (Aneflus) lengi, new species.

Dark piceous, almost black, elongate; thorax and elytra clothed with short, not densely placed cinereous hairs. Head coarsely and densely punctate. Antennæ slightly longer than the body in the male; third, fourth and fifth joints distinctly carinate, the following joints scarcely so; the joints from the third to the sixth spinous on one side, the spines not long and, as usual, gradually diminishing in size. Thorax slightly longer than wide; sides feebly subangulate and slightly constricted near base; disk coarsely and densely punctate, a narrow, elongate, smooth median space and two, more or less distinct, rounded, smooth spots on each side of middle. Elytra wider at base than the thorax and about four times as long as the thorax; sides almost parallel; apex emarginate-truncate; surface moderately coarsely punctate near base, punctures, as usual, gradually finer and sparser towards apex. Metasternum coarsely punctate; abdomen sparsely and finely punctuate. Tibiæ carinate. Length 12 mm.

Huachuca Mts., Arizona, one male collected by E. A. Oslar, and kindly given me by Mr. Chas. W. Leng, to whom I take pleasure in dedicating this species.

From the smaller species with more or less carinate antennal joints, placed at present in the genus *Aneflus*, *lengi* differs in the much darker, more shining surface, the relatively short spine on the third antennal joint and the more or less distinct smooth spots or callosities on each side of the smooth median line.

Monohammus notatus Drury, Ill. of Exot. Insects, Vol. II, p. 64, pl. xxxv, fig. 2 (1773).

Monohammus confusor Kirby, Fauna Bor. Am., Vol. IV, p. 168 (1837).

Mr. Leng in one of the meetings of the New York Entomological Society called attention to a paper on North American Cerambycidae by C. J. Gahan, published in the Annals and Magazine of Natural History, Ser. 8, Vol. I, p. 140. The changes and new names proposed in this paper by Mr. Gahan will be found in the minutes of the Society in Vol. XVI, p. 242, Journ. N. Y. Ent. Soc., except the following which is omitted and of which I give the note in full for the benefit of those not having access to the publication.

“ *Cerambyx notatus* Drury, Ill. of Exotic Insects, Vol. II, p. 64, pl. xxxv, fig. 2, and index (1773).

This species is omitted from the Catalogue of Gemminger and Harold, and appears to have escaped the notice of North American entomologists. Drury’s figure and description of it are so good as to leave no reason to doubt that it is a North American species of *Monohammus*, identical with *M. confusor*, Kirby. The latter name, being much later in date, must go as a synonym.”

Pogonocherus concolor, new species.

Almost uniformly clothed with yellowish cinereous pubescence; elytral costæ without tufts. Antennæ densely pubescent with short cinereous hairs and with numerous, longer, erect hairs; first joint elongate, feebly clavate, nearly reaching to the lateral thoracic spines; third joint slightly longer than fourth, the remaining joints rapidly diminishing in length. Thorax with a large tubercle on each side; discal tubercles distinct, but without median smooth space; pubescence dense and unicolorous yellowish cinereous with a few longer, erect hairs intermixed. Elytra densely pubescent with yellowish cinereous hairs and intermixed with a few longer, erect hairs; costæ rather feeble; tubercles scarcely evident except the subapical, which is very distinct; punctuation sparse and not coarse; apices rounded. Femora and tibiae clothed with cinereous short, and longer erect hairs. Abdomen finely and densely punctate, feebly pubescent at middle with short hairs, which are much longer at sides. Length 7 mm.

California? one male.

This species has the form of *Ecyrus dasyserus* and will be easily known by its uniform pale coloration, feeble elytral costæ without tufts and the longer first antennal joint, which, however, is slightly shorter and a little stouter than in *volitans*.

TABLE OF THE SPECIES OF POGONOCHERUS.

Elytra truncate or emarginate-truncate at apex; apical angles more or less dentate	1.
Elytra rounded at apex.....	4.
1. Elytra costate and with a distinct tubercle or tuft of black, erect setæ on each side of middle near base.....	2.
Elytra not costate and without tubercle or tuft of black, erect setæ at middle near base.....	3.
2. External apical angle of elytra with a relatively long, acute spine; pubescence almost uniformly gray, intermixed with long, erect, white hairs; elytra without tufts of erect black setæ, but with a very prominent subbasal tubercle on each side of middle.....	<i>erinitus</i> Lec.
External apical angle of elytra scarcely prolonged; pubescence gray and white, the latter color forming a more or less distinct subbasal fascia; costæ with tufts of erect black setæ.....	<i>penicellatus</i> Lec.
3. Elytra on each side with three tufts of erect black setæ.....	<i>arizonicus</i> Schaeff.
Elytra without tufts of erect, black setæ	<i>mixtus</i> Hald.
4. Elytral costæ without tufts of erect black setæ, but with a few more or less distinct tubercles; color uniformly yellowish cinereous.....	<i>concolor</i> n. sp.
Elytral costæ with distinct tufts of black erect setæ.....	5.
5. Thorax with a distinct shining tubercle on the median line slightly below middle; pubescence dark brown, feebly variegated with white, the latter color condensed on each side into a large spot at basal third.....	<i>alaskanus</i> Schaeff.
6. Lateral thoracic tubercles more or less prominent, but never developed into an acute spine.....	7.
Lateral thoracic prominences developed into a relatively long acute spine.....	9.

7. Thorax, viewed laterally, feebly transversely impressed near apex, causing the almost entire obliteration of the usual discal tubercles; pubescence dark brown or black and cinereous, the latter color condensed into a more or less distinct subbasal and apical fascia; elytral punctuation very feeble or absent slightly below middle.....*oregonus* Lec.
 Thorax, viewed laterally, distinctly transversely impressed near apex; discal tubercles distinct..... 8.
8. Longitudinal interantennal impression feeble; elytra with yellowish cinereous oblique fascia, starting below the humeri to suture and extending more or less distinctly along the suture to apex; above this fascia the base is blackish; the pubescence at sides of each elytron grayish; costæ with a few more or less distinct tufts of erect black setæ.....*negundo* Schaef.
 Longitudinal interantennal impressed line distinct; pubescence of elytra uniform gray except as variegated by the erect tufts of black setæ.....*californicus* Schaef.
9. Antennal scape attaining the acute thoracic spine; elytral pubescence nearly as in *negundo*, but slightly paler, and at base is not the distinct subtriangular blackish space.....*volitans* Lec.

In all the species the pubescence is intermixed with longer erect hairs. These hairs are shorter in *mixtus* and *arizonicus*, longer and more numerous in most of the other species.

In the above table I have placed *alaskanus* in the section with rounded elytral apices, while in the description they are stated to be truncate and proposed to be placed near *penicellatus*. However, as the outer apical angle is rounded the form of the elytral apices are more correctly called rotundate-truncate.



A NEW CLERUS.

BY CHARLES W. LENG,
 NEW YORK.

One of the results of a two weeks' vacation spent in the mountains of northern Georgia with my friends William T. Davis, Dr. E. G. Love and Charles Dury, was the capture of a brilliant Clerus which appears to be undescribed. As examination of the literature at my disposal and consultations with Mr. Joutel and Mr. Charles Schaeffer, both of whom have closely studied the family Cleridæ, all fail to disclose a name for this insect, I venture to describe it.

Clerus jouteli, new species.

Dark greenish bronze, almost black, above and beneath, except thorax, which has a purplish reflection, and abdomen, mesosternum, hind femora, palpi and under-

side of scape of antennæ which are bright orange (almost red in life); thickly clothed with black hair, which are erect and especially so on the anterior part of the elytra; the elytra bear also, a little in front of the middle, a vague broad transverse band composed of recumbent cinereous hairs and less conspicuous clouds of same at apex and base. Head and thorax confluent punctate, elytra less deeply punctate but more nearly tuberculate in sculpture and vaguely subcostate near suture. Body beneath and legs similarly roughly sculptured. Abdomen feebly punctate and more shining. Eyes large, finely granulate, emarginate for insertion of antennæ. Thorax constricted at the sides, disc deeply impressed in front of the middle; the impression, which is of uniform depth and slightly arcuate posteriorly, reaches from side to side, connecting the constrictions of the side margin, behind the impression the thorax is rounded and convex. Length, 10 mm. = .40 inch; width, 3.8 mm. = .15 inch.

One specimen, taken on summit of Screamer Mt., Rabun Co., Ga., June 15, 1909; elevation, 3,500 feet.

This species closely resembles *C. sphägeus* in size, form and sculpture but differs in color, maculation and form of thorax which in *sphägeus* is much flattened behind the impression. The orange color of the hind femora is also a most conspicuous difference. I take pleasure in naming this insect for my friend, Louis H. Joutel, in recognition of his studies in the Cleridæ.

SOME NEW AND LITTLE-KNOWN COCCIDÆ.

By T. D. A. COCKERELL AND W. W. ROBBINS,
BOULDER, COLORADO.

Aspidiotus arctostaphyli, new species.

Scale of female: 1-2.2 mm. in diameter, subcircular, moderately convex, pale reddish gray in color. Exuviae pale orange color.

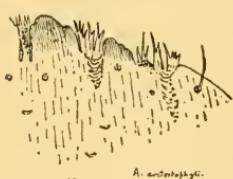


FIG. 1. *Aspidiotus arctostaphyli*, new species.

Adult female: .85-1 mm. long, .5-.7 mm. wide at widest part. Pale yellowish orange in color. Entire body translucent except anal plate. Anal plate slightly chitinized. Two pairs of median lobes; third and fourth pairs represented by mere projections. Median lobes slightly oblique; broadly rounded apically with notch on inner and outer margins; the outer one more distinct. Small chitinous thickenings present on inner side of median lobes; thickenings of first interlobar incision feeble. Second lobes very broad, feebly crenulated. Spines distinct; one at base of median and second lobes, another just beyond last projection and a fourth far beyond last projection. In the depressions between the median lobes, between the median and second lobes and beyond the second lobes are large plates with a number of teeth. The plates between the median lobes and between

the median and second lobes are narrower than those beyond second lobe. The number of teeth is variable. Anal opening oval, .05 mm. from tip of median lobe. Paragenitals in five groups; caudolaterals 3-4; cephalo-laterals 7; median 4. Dorsal pores prominent and very numerous. Longitudinal thickenings enclosing the vaginal opening; this opening about .1 mm. from the tip of median lobes.

Male: Length (exclusive of caudal stylus) .57 mm.; caudal stylus .34 mm.; breadth of thorax .34 mm.; color yellowish brown, the abdomen and tip pallid; probably yellower in tip. Compared with other *Aspidiotus* males, it is remarkable for the very robust thorax, which, as mounted in balsam, shows a median pale line, and imperfect lateral ones.

Very closely allied to *A. densifloræ* Bremner, but distinguished by the color of the scales and the broad second lobes. *A. densifloræ* is described as having the median group of circumgenital glands one or none.

On leaves of *Arctostaphylos viscida* Parry, Red Bluff, Tehama Co., Cal. Coll. Elizabeth Hermann. Received from Prof. C. F. Baker.

Aspidiotus perniciosus Comstock.

On Ben Davis apples, Grand Junction, Colorado (O. B. Whipple com. C. P. Gillette). New to Colorado.

Pseudopeltaria ostreata Cockerell.

On *Carica papaya*, Santiago de las Vegas, Cuba (C. F. Baker). New to Cuba. Prof. Baker also collected at Santiago de las Vegas *Peloiococcus rosæ* (Riley & Howard), on *Bursera gummifera* and *Parlatoria pergandii* Comstock, on orange.

Pseudococcus juniperi (Ehrhorn).

On *Sabina monosperma*, Cañon City, Colorado (E. Bethel). Not quite typical, but evidently this species. New to Colorado. At Cañon City Mr. Bethel also collected *Ceroputo calcitector* (Cockerell) on *Agropyron*; another addition to the Colorado fauna.

Chionaspis sassceri, new species.

Scale of female: 1.5 mm. long, expanding posteriorly, somewhat curved; secretion ashy gray, smooth, not dense; ventral scale present.

Adult female: Length .5 to .8 mm., breadth at widest point about one half length. Body after boiling in KHO hyaline; anal plate broader than long. Median lobes touching at base and widely spreading toward tip; in some specimens, however, the median lobes are more or less parallel; tips of median lobes rounded; inner lobe of first lateral pair less than one half width of median lobe; outer lobe of first lateral pair very short and much smaller; second pair of laterals represented by an inner and outer lobe, the latter being small and indistinct. No median spine-like plates; others 1, 2, 2, 2, 5-6. Spines rather large. Anal opening about one fifth of length of body from base; about diameter of the median lobe. Paragenitals 13, 24-

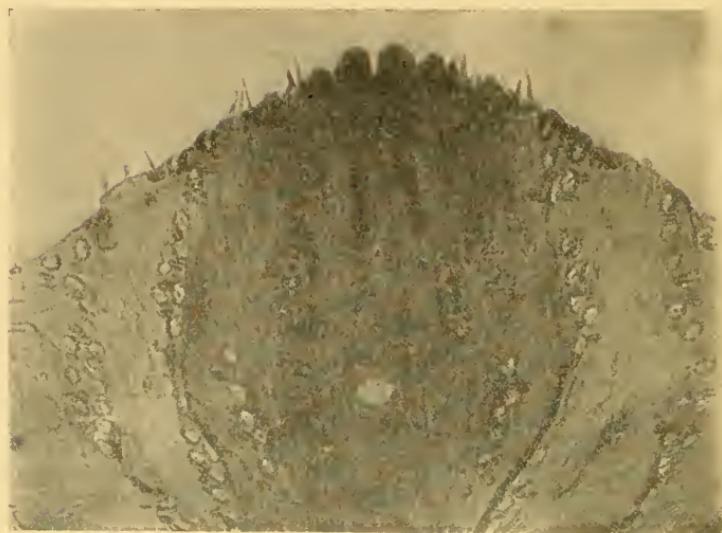


FIG. 2. *Chionaspis sassceri*, new species.

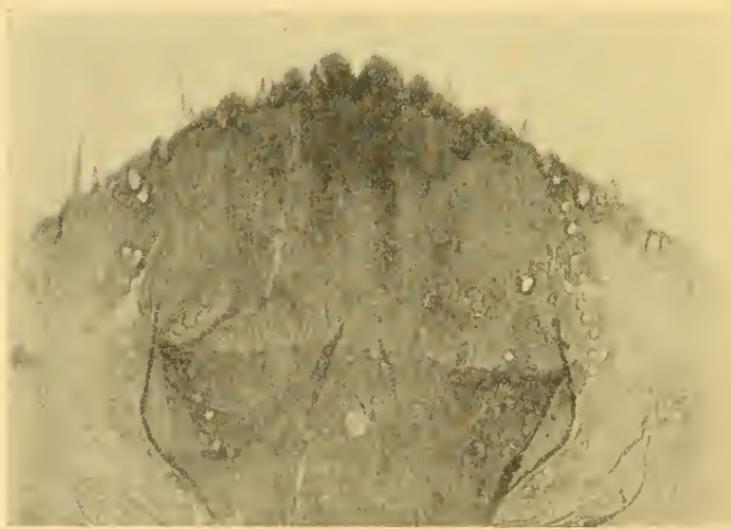


FIG. 3. *Chionaspis micropori*, Marlatt.

25, 16-22. Dorsal pores elongated and much larger than paragenitals; inner row 7; second row in two groups of 9 and 7; third row in three groups of 13, 4 and 3; fourth row in two groups of 11 and 5; fifth row consisting of one group of 9. Pygidium slightly chitinized.

Type.—University of Colorado. Collected on orange, at Fallbrook, California, by F. Austin. (Comm. Prof. C. F. Baker.)

The scales occur upon the bark in large numbers, and must be highly injurious. We had at first identified this species with *C. micropori* Marlatt, but after some correspondence with Mr. E. R. Sasscer we must follow his opinion, expressed on first seeing specimens, that it is distinct. The resemblance is certainly very close, but our insect has much larger dorsal pores, and the texture and size of the scale are different, that of *C. micropori* being very dense and chalky white. The second lateral lobe of *micropori*, as in our insect, seems to be normal, with a distinct outer lobule, notwithstanding the statement to the contrary in the original description. We are indebted to the kindness of Mr. Sasscer and Dr. Marlatt for specimens of *C. micropori*, and to Mrs. Sasscer for photographs of both species.

OBSERVATIONS ON TWO SPECIES OF HYALOPTERUS (APHIDIDÆ).*

BY PAUL HAYHURST,

BOSTON, MASS.

(WITH PLATE I.)

The only species of *Hyalopterus* Koch hitherto recognized by American writers is, so far as I know, *H. arundinis* Fabr. (*H. pruni* Fabr.). This is the well-known greenish, pulverulent aphid of an elongated form, with extremely small cornicles, which infests the under side of the leaves of plum trees. An account is here given of two other species which I believe have not been noticed before in the United States. *Hyalopterus aquilegiæ-flavus* (Kittel) which infests the columbine and rose in Europe, was found on these plants on the grounds of the Bussey Institution last fall. *H. dactylidis* n. sp. is an elongated yellowish aphid which I have taken on orchard grass, *Dactylis glomerata*, in the District of Columbia and at Forest Hills, Mass.

The winged and wingless viviparæ of *Hyalopterus aquilegiæ-flavus*

* Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 6.

were very numerous on the leaves of the garden columbine, *Aquilegia vulgaris* L., during September, 1908. They preferred the under surface of the leaves, although many individuals also occurred on the upper surface. A species of *Macrosiphum* was abundant on the stems of the same plants, and was also often mingled with the *Hyalopterus* in the same colonies.

On separating the specimens of these two species, which had been collected together on September 25 I was struck with the similarity of the *Hyalopterus* to specimens taken on rose bushes September 29, which were standing within a few rods of the columbines. These winged viviparae proved to be identical in structure and markings with those from the columbines. There was one winged male of this genus among them, its conspicuous genitalia allowing no doubt of the sex. This discovery led me to suspect that the viviparae collected on the roses might be sexuparae from the *Aquilegias*. On looking up the literature I found that the migration from the rose to the columbine in May had been observed by Francis Walker in England fully sixty years ago. He states that it feeds "equally on the upper surface and on the under surface of the leaf, which often becomes red or purple from its injuries. It continues on that plant till the end of October." I did not notice that these aphids had any injurious effect on the leaves last fall. They are rather sluggish in their movements as compared with the active *Macrosiphums*. It is to this sluggishness that Walker doubtless refers in describing the species as having "a very quiet disposition."

On May 19, 1909, I found many green, lightly pulverulent aphids of this species on the tender shoots of the cinnamon rose, *Rosa cinnamomea* L. standing near the clumps of columbines. There were a few wingless adults beginning to deposit young, but most of the aphids were well advanced larvae and these with the adults were in all probability the stem-mothers. The infested shoots and leaves did not show any injurious effect. Thorough examination was made of the columbines without finding any specimens of *Hyalopterus*, although there were many *Macrosiphums*. It is evident then that the hibernating eggs had been deposited on these roses last fall, which are therefore the primary host of the insect. We may expect to see the migrants from the roses establishing their broods on the columbines in June in this latitude. Evidently the winter eggs may, under some conditions, be deposited on the columbines, for Koch (1857) observed the isolated adult stem-mothers depositing larvae on the leaves

of these plants in Germany towards the end of May and he noticed the winged viviparae on the same hosts early in June. From these observations Mordwilko (1907) assumes that the species is not yet fixed in its migratory habits. This would not be at all surprising, since there are other migrating species which infest the secondary host much later in the season after the fall migrants have left for the primary host. The viviparae, e. g., of *Aphis bakeri* Cowen remained on the secondary host, red clover, until after freezing last fall at Forest Hills, and the true sexes and a few hibernating eggs were found on this plant late in October. I have also seen the adult oviparae of *Myzus persicæ* Sulz. in October on radishes in Massachusetts.

The following points in the life-cycle of this species remain to be worked out. The migrations have never been actually demonstrated by artificial transfers. Mordwilko has shown that individuals from the columbines could be induced to live on the rose nine days in September, but he does not state that oviparae or fertilized eggs were thus produced. These females have never been described. The species according to Walker may be injurious to columbine leaves, but no one else seems to have noticed such injuries.

This species is now known in the following countries: France, England, Germany, Italy, Belgium, Russia and the United States. It may be looked for anywhere in a temperate zone where the rose and columbine grow. It is most probable that it has been distributed over the world as hibernating eggs on the nursery stock of roses, which are, of course, imported during the dormant season.

Hyalopterus aquilegiæ-flavus (Kittel) was first described in the Mémoires Soc. Linn. Paris for 1826 under the name *Aphis Aquilegiæ flava* in such language as to allow no doubt of its identity. Schouteden (1906) restores Kittel's name, but drops *Aquilegiæ* on the ground that it is "inconvenient." I prefer, however, to retain the entire name supplying a hyphen to make it binominal in effect. The Law of Priority does not permit the rejection of original names because of inappropriateness and it gives no authority for rejection on account of inconvenience. Hyphenated compounds are recognized as binominal by the A. O. U. Code, Rev. Ed., 1908, p. xxxvi, and were used by Riley, Walsh and Osten-Sacken in describing gall insects.

Hyalopterus dactylidis sp. nov., as already stated, is the yellow aphid with blackish eyes which infests the blades of orchard grass. The insects arrange themselves on the dorsal surface in the furrow of

the leaves in single file, most frequently with their heads directed downwards. Isolated adults may often be seen with several pale yellowish larvæ in a row immediately behind their mothers.

I have collected this species at Ft. Myer, Va., in the District of Columbia and at Forest Hills, Mass. They were common where the grass was growing rankly, but were not easy to find elsewhere. The winged viviparæ were always extremely rare. Wherever I have found this species there seemed to be little need for the colonizing forms, since even the wingless viviparæ were not especially productive and the aphids never occurred in such numbers as to seriously injure the plants. The apical portion of many of the infested blades was yellowed chiefly along the midrib as if caused by an earlier attack of the insects when the leaves were more tender. This was especially noticeable on many blades which carried a long row of adults and larvæ stationed below the yellowed part. But many infested leaves did not appear to be injured at all. Thus the insects always had a luxuriant growth of foliage before them and were never in danger of extermination by the death of the host as are many other species which multiply so rapidly as to endanger their food supply. I observed this species at several points around Washington on orchard grass during June, July and August, 1907, all forms becoming very rare after June. Other collections were made as follows: Washington, D. C., March 27, 1908, on tall red-top, *Tricuspid seslerioides* by Mr. C. N. Ainslie, of the Bureau of Entomology; wingless adults and well-advanced larvæ. Tennallytown, D. C., March 30, 1908, orchard grass; fairly numerous, wingless adults, several pupæ, larvæ of all sizes. Forest Hills, Mass., September, October to November 30, 1908, orchard grass. Numerous until November. When last observed they were very rare and were still reproducing. Same locality — April 8, 1909, orchard grass, common; wingless adults and larvæ.

Thorough search was made for the true sexes and eggs at Forest Hills during November and December; none were found on any part of the plant or on the débris on the ground. This fact, together with the early collections of reproducing adults when it would seem impossible for them to have developed from hibernating eggs, led me to suspect that *Hyalopterus dactylidis* winters over as viviparæ. The true sexes may not exist in this species. It is possible that some other species may hibernate in the viviparous form even in Massachusetts on hardy grasses like orchard grass and quack. I have often observed

that aphids can stand considerable freezing in the fall, if their host is hardy, while other individuals of the same species on tender plants perish with the death of the host.

Since *Dactylis glomerata* is an introduced grass from Europe, the aphids must infest other grasses in this country from which they have gone over to orchard grass unless they were introduced with this plant; but the species has apparently not been noticed by European writers.

I have never seen this aphid attended by ants. Two species of hymenopterous parasites were reared from the wingless viviparæ. *Lysiphlebus cerasaphis* Fitch turns the host brown as in most parasitized aphids, while the other, *Ephedrus* sp., probably *plagior* (= *parcicornis*) Nees causes the aphid to become coal black. They were collected at Forest Hills, Mass., May 22-23, 1909. I am indebted to Mr. C. T. Brues who kindly determined these parasites for me.

The wingless viviparæ of *Hyalopterus dactytidis* are remarkable in possessing a pronounced outpushing of the posterior lateral angle of the prothorax (Fig. 9). I have examined many specimens both living and in formalin and find this character normal and not especially variable. It is present, but less conspicuous, in the wingless viviparæ, fall forms, of *H. aquilegiæ-flavus* on columbine. It is not discernible in the youngest larvæ with 4-jointed antennæ, but is very evident in half grown larvæ (1 mm. long) with 5-jointed antennæ. Judging from the few specimens of the winged viviparæ which I have seen the third discoidal is apt to be very variable. I have at hand only nine specimens, three of which have the usual type of venation in the *Aphidinæ* on both wings (Fig. 10). The other six are as follows:

- (a) One wing with unbranched third discoidal as in *Pemphigus*, the other wing with irregular atrophied branches (Fig. 10, c-d).
- (b) Third discoidal 2-forked in one wing, but 1-forked in the other as in *Toxoptera* (Fig. 10, a).
- (c) Two specimens with all the third discoidals 2-forked, the second fork close to the margin as in *Aphis (Siphocoryne) avenæ* Fabr. (Fig. 10, b). The vein figured also shows a supernumerary branch near the second fork.
- (d) One vein single, the other 1-forked.
- (e) Both third discoidals 1-forked, but in one wing the first branch

is lost, in the other the second branch. Fig. 10, *e-f*, represents two stages in the reduction of the upper branch of the second fork.

In other respects this species is not especially variable. While studying it at Washington I noticed several other examples with the third discoidal 1-forked, reminding one of the normal venation in *Toxoptera*. I noticed that the single forked third discoidal was a frequent variation in *Aphis (Siphocoryne) avenae* which I collected on wheat at several points in Oklahoma and Georgia in the fall of 1907.

The following descriptions are all from balsam mounts. No color notes were made of the *H. aquilegiæ-flavus* collected in the fall. The colors of all other forms are from the living insects, high power hand lens, daylight. The bodies of these aphids preserved in 70 per cent. alcohol and mounted with the usual technique are not shrunken enough to be unfit for measurements judging by comparison with formalin material. Measurements at the best are only approximate, the size depending greatly on the supply of food and other conditions. For this reason I do not see the necessity for measuring many specimens. I have adopted the practice of picking out two of the smaller specimens, two typical and two of the largest from a large number collected, and thus the average size can be obtained accurately enough for systematic purposes. Whole mounts of *H. aquilegiæ-flavus* usually show a flat vertex; whether the median ocellus is visible or not on the vertex depends, of course, on the position of the object.

***Hyalopterus aquilegiæ-flavus* (Kittel).**

Aphis Aquilegia flava sp. nov., Kittel, Mém. Soc. Linn. Paris, Vol. 5, 1827, p. 48. On leaves of *Aquilegia vulgaris* L., France. Description of winged form. (The short cornicles, long cauda, dark bands on the abdomen and the oval shape are sufficient evidence that this is the same as Walker's species.)

Hyalopterus flavus Kittel, Schouteden, H., Cat. d. Aphid. de Belg., Vol. 12, 1906, p. 230. Rose and *Aquilegia vulgaris* in Belgium. Synonomy; restores Kittel's name in part.

Hyalopterus aquilegiæ n. sp., Koch, C. L. Pflanzenläuse, 1857, pp. 19-20, pl. 4, figs. 25-26. Descriptions and colored figures of winged and wingless viviparae Germany; stem-mothers (Altmütter) isolated on under side of leaves of *Aquilegia vulgaris* towards the end of May, winged viviparae appearing early in June. (Evidently then, the hibernating eggs must have been laid on this host without a migration.)

Aphis trirhoda n. sp., Walker, Francis, Ann. Mag. Nat. Hist. (London), Vol. 4 (2d ser.), 1849, pp. 45-46. Descriptions of winged and wingless viviparae. Migration from rose to columbine in May. Brief description of winged male.

Hyalopterus trirhoda (Walker) Passerini, G., Aphididae Italicae (Archivio per la Zool. l'Anat. e la Fisiol., Modena, Vol. 2, fasc. 2), 1863, pp. 149, 150. Italy; *Aquilegia vulgaris* in summer and *Rosa indica* and *R. gallica* in autumn. Differen-

tial characters of winged and wingless viviparae, and mention of winged male as a known form.

Passerini, G., Flora degli Afidi Ital. (Bull. Ent. Soc. Ital., Vol. 3), 1871, pp. 150, 336. *Aquilegia vulgaris* in summer; Italy, also on *Rosa indica* and *R. gallica* in summer.

Buckton, G. B., Brit. Aphid., Vol. 2, 1879, pp. 114-115, pl. 77, figs. 1-4. *Aquilegia vulgaris* June to September, England; descriptions and colored figures of winged and wingless vivipara and pupa, line figure of antenna of winged vivipara. *H. aquilegiæ* Koch = *Aphis trirhoda* Walker.

Del Guercio, G., Prospetto dell' Afido fauna Ital. (Nuov. Relaz. R. Staz. Ent. Agrar., Firenze 1), No. 2, 1900, pp. 146, 147. From Passerini.

Warren, Ernest, Biometrika (London), Vol. 1, No. 2, 1902, pp. 129-154. On variation and inheritance in the parthenogenetic generations.

Mordwilko, A., Beiträge zur Biol. d. Pflanzenläuse (Biol. Centralbl., Bd. 27, No. 24), 1907, pp. 815-816. Reviews Passerini and Koch. Mordwilko collected wingless viviparae and their larvae on *Rosa centifolia* at Warsaw, Russia, May 20, old style (June 1, new style), 1898, and winged viviparae were observed June 18 (n. St.). The last week in July the wingless viviparae and occasional winged viviparae on the leaves of *Aquilegia*. On September 5, 1903, aphids were transferred from columbine to the rose on which they lived until September 14. (He does not state whether they deposited oviparae, this experiment did not therefore prove their migration.) Sexuparae and the true sexes can be found on rose in the fall. *H. trirhodus* is a polyphagus species, judging from Koch's observation of the stem-mothers on columbine in May.

Winged vivipara from Aquilegia: Head blackish (Fig. 3); antennæ (Fig. 4) dusky, usual number of sensoria on III 80-90 (62, III), each sensorium on a pronounced tubercle, sensoria on all aspects of the joint, most numerous on posterior aspect, but fewer in number on anterior aspect, the other joints without sensoria, except the usual ones on V and VI. Eyes blackish red; beak passing anterior margin of mesosternum but not attaining transverse sternal suture. Pronotum dusky, lateral tubercle absent, represented by a short seta; lobes black, lateral plates, mesosternum and metasternum dark brownish or blackish; forewing, Fig. 2, veins stont, venation not especially variable; legs yellowish brown, usual dark portions blackish. Abdomen (Fig. 5) yellowish; the squarish dusky patch sometimes represented by three broad transverse dusky bars; the last dusky bar (on 8th segment) often indistinct; no lateral tubercles. Cornicles (Fig. 8) and cauda (Fig. 6) pale yellowish or the cornicles translucent, the cauda with 8-10 lateral setæ.

Measurements: Length of body (less canda) 1.907 mm. (1.74-2.08); greatest width of abdomen .888 (.783-1.00); antennæ (average III-filament inclusive) 1.537; III .806 (.774-.929); IV and V each .209 (.172-.241); VI (scape) .147 (.110-.172); filament .166 (.120-.189); forewing 3.12 (3.045-3.393); cornicle .103; cauda .220 (.206-.241).

Walker gives the colors of this form as follows: head, lobes of thorax, lateral and sternal plates, maculations of abdomen, antennæ, eyes, apex of beak, of femora and of tibiæ and the tarsi black; main body color pale greenish yellow, varying to dark green, cornicles and legs pale yellow. Koch's description is essentially the same.

Wingless vivipara.

Whole body yellowish; two dorso-lateral longitudinal rows of impressed dusky spots or short transverse lines, arranged segmentally in pairs, the first pair on the prothorax, the last pair on the sixth abdominal segment; otherwise without maculations. Antennæ without sensoria except the usual ones on V and VI, the third joint distinctly or slightly swollen on anterior aspect near the base, the entire appendage pale yellowish except the dusky sixth joint (including filament); eyes dark red; beak passes anterior margin of mesothorax, but does not attain mesocoxæ; prothorax with lateral margin angulate (Fig. 1); legs pale yellowish, only the tarsi dusky; cornicles usually with the apex brownish. Elsewhere as in winged vivipara.

Measurements: Length of body (less cauda) 1.965 mm. (1.783-2.175); greatest width of abdomen (3d segment) .983 (.870-.104); antennæ (III-filament inclusive) 1.05; III .513 (.430-.601); IV .152 (.138-.172); V .146 (.138-.170); VI (scape) .111 (.103-.120); filament .129 (.120-.138); cornicle .086; cauda .268 (.223-.310).

Walker gives color of this form as follows: green, "covered with a white bloom," all appendages including cornicles and cauda whitish, eyes dark brown. Buckton describes it as yellowish green with the cauda yellow. Koch describes the whole body as whitish yellow to greenish; all appendages very pale yellowish. He figures this form with ten brownish transverse bars above beginning with the prothorax, one for each segment to the seventh abdominal inclusive.

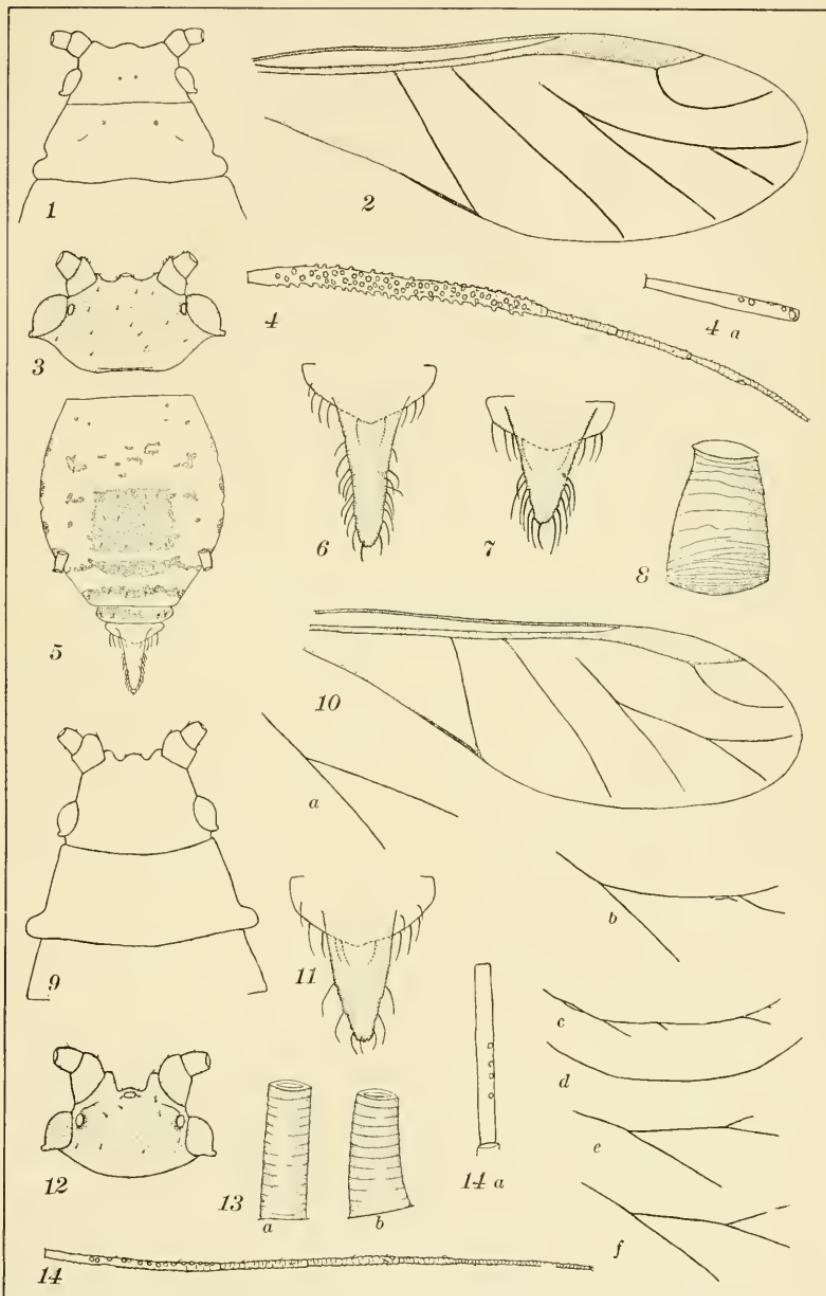
Wingless vivipara, rose, May 23.

Head yellowish green or whitish green; antennæ I-II concolorous, elsewhere whitish or whitish yellow except the greenish articulations between joints III-IV, IV-V, and the dusky or blackish filament, or distal half of scape of VI and filament; eyes black (even when dampened with alcohol, which ordinarily makes the "black" eyes of plant lice appear dark red); beak whitish, apical joint brownish; legs whitish or greenish white, tips of tibiae brownish, tarsi dusky; prothorax not angulate; thorax and abdomen yellowish green, generally very lightly pulverulent; two longitudinal dorso-lateral rows of deep green marks or spots, one pair on each segment between the sutures beginning with the prothorax and ending with the 6th abdominal segment, those on the abdomen take the form of transverse bars which are usually not confluent on the meson, but sometimes extend clear across; cornicles pale greenish with brownish apical ring; cauda light yellowish. Ventral aspect green, unicolorous, distinctly pulverulent. Elsewhere as in the first described wingless vivipara.

Measurements: Length of body (less cauda) 1.914 mm. (1.74-2.088); greatest width of abdomen (2d and 3d segments) 1.087 (.957-1.218); antennæ (III-filament inclusive) 1.186, III .579 (.533-.637); IV .180 (.155-.206); V .172 (.155-.189); VI (scape) .123 (.120-.128); filament .132 (.120-.138); cornicle .091 (.086-.102); cauda .310 (.292-.327).

From 15 living specimens.

It will be seen from the above that the spring forms have broader abdomens and longer antennæ, cornicles and cauda than those on columbine in the fall.



Paul Hayhurst

Aphididæ.

Winged male.

Third joint of antennæ with about 80 sensoria, V with 5 sensoria towards apex (Fig. 4, *a*); eyes black, beak just passing anterior margin of mesosternum. Abdomen yellowish, the large quadrate dusky area of the winged vivipara represented by three broad transverse dusky bars; cauda, Fig. 7. Otherwise as in winged vivipara.

Measurements: Length of body (less cauda) 1.305; antennæ (III-filament inclusive) 1.55; III .688; IV .258; V .241; VI (scape) .155; filament .206; forewing 2.61; cornicle .069; cauda .12.

One specimen, apparently of this species, from rose, September 29.

This male is exceptional among plant lice in having no more sensoria on joint III than in the winged vivipara, but this female has so many sensoria that the male could hardly bear any more.

Hyalopterus dactylinus, new species.

Winged vivipara: Head (Fig. 12) light yellow; antennæ (Fig. 14) I-II and base of III concolorous; elsewhere brownish or black; III with 11-15 sensoria in a nearly straight row on posterior aspect, not on tubercles; each posterior ocellus bounded mesally with a heavy black border, a dusky or black area mesal and behind each posterior ocellus; compound eyes dark or blackish red; beak barely attaining middle of anterior pair of mesosternal plates. Prothoracic lateral tubercle absent; prothorax light yellow, mesothorax deeper yellow (lemon cadmium), prescutum, scutal lobes, lateral and sternal plates brownish yellow, scutellum and postscutellum yellow, the posterior apex of the latter dusky or black; forewing (Fig. 10) with third discoidal extremely variable (Fig. 10, *a-f*); veins slender; femora pale yellowish green, tibiae light brown, the apex dusky, tarsi dusky. Abdomen pale greenish or yellowish green without maculations; without lateral tubercles, cornicles (Fig. 13, *a, b*) concolorous, or paler than the abdomen, broader at the base than at the apex, or cylindrical; cauda (Fig. 11) light yellow with three or four pairs of lateral setæ.

Measurements: Length of body (less cauda) 1.688 mm. (1.52-1.78); width of abdomen .50 (.478-.522); antennæ (base of III-filament inclusive) 1.385; III .446 (.395-.516); IV .234 (.206-.258); V .244 (.206-.275); VI (scape) .138; filament .323 (.292-.378); forewing 2.914 (2.827-3.132); cornicle .079; cauda .199 (.189-.206).

Wingless vivipara: Head, Fig. 9; antennæ I-II concolorous, III-V translucent yellowish, VI including filament dusky to black, 3-4 sensoria on or near posterior aspect of III, rarely 1, 2, 5 or none (Fig. 14, *a*). Prothorax, Fig. 9. Entire thorax yellow (pale lemon chrome or lemon cadmium) or the meso- and metathorax greenish yellow or yellowish green; tibiae pale yellowish or greenish yellow with apex slightly dusky. Abdomen unicolorous with meta- and mesothorax. Entire body without maculations. Cauda stouter, apex broader than in winged vivipara. Elsewhere as in winged vivipara.

Measurements: Length of body (less cauda) 2.081 mm. (1.784-2.392); greatest width of abdomen (segments 1-4 about same diameter) .783 (.696-.870); antennæ (III-filament inclusive) 1.06; III .324 (.292-.361); IV .161 (.138-.172); V .177 (.138-.189); VI (scape) .117 (.103-.120); filament .281 (.223-.327); cornicle .086; cauda .238 (.206-.275).

Types No. 12322. U. S. National Museum. Type locality, Forest Hills, Mass.

NEW AMERICAN ORIBATOIDEA.

BY H. E. EWING,

ARCOLA, ILLINOIS.

(WITH PLATES II-VI.)

The group to which the "beetle mites" belong has been considered by many authors as a family. Mr. A. D. Michael, in his "British Oribatidæ," regarded the group as such; and later, in 1898, in, "Das Tierreich" (Lief. 3. Oribatidæ) he divided the family into seven subfamilies. Mr. Nathan Banks in a treatise entitled, "The Acarina or Mites" (Proc. U. S. Nat. Mus., vol. 28, pp. 1-114) has regarded the group as a superfamily which he calls Oribatoidea, dividing it into two families as follows:

Cephalothorax movably attached to the abdomen; palpi four-jointed.

Fam. HOPLODERMIDÆ.

Cephalothorax not movable; palpi five-jointed..... Fam. ORIBATIDÆ.

I agree with Mr. Banks in calling the group a superfamily. The separation of those forms which have the cephalothorax movably attached to the abdomen, from those which have the cephalothorax coalescing with the abdomen is, I think, very natural. These forms to which he gives the family name Hoplodermidæ have many other characters of prime importance which separate them from the rest of the group as will be seen by the characters assigned to each of the groups in the following table. I have also followed G. Canestrini in separating those forms which have abdominal wings from those which do not; and retain the name he applied to those without the wings, Nothridæ. The author gives the following families into which the group may be divided and the characters of each.

In this paper thirty-one new species are described. The writer is very much indebted to Mr. C. R. Crosby for the specimens collected in Missouri; to Mr. C. A. Hart for Texas material and to J. D. Hood, C. A. Hart and L. M. Smith for collections in Illinois.

Superfamily ORIBATOIDEA.

<p>— Cephalothorax hinged to abdomen and capable of being folded down on the ventral surface of the same ; body compressed ; without tracheæ ; mandibles very large and prominent ; palpi of four segments ; integument often brittle and thin ; legs very stout.....</p>	<p>HOPLODERMIDÆ.</p>
<p>— Cephalothorax not hinged to abdomen but firmly and immovably attached to the same ; body often depressed ; with tracheæ opening at the acetabula of the legs ; mandibles small ; palpi of five segments ; integument well chitinized and usually stout ; legs often long and slender.</p>	<p>— Abdomen with chitinous wing-like expansions called pteromorphæ, which are often capable of being folded over the flexed legs ; legs never enlarged or thickened ; integument usually smooth and shiny.</p>
	<p>ORIBATIDÆ.</p>
	<p>— Abdomen without wing-like expansions ; segments of legs sometimes thickened or swollen ; integument often rough.....</p>
	<p>NOTHRIDÆ.</p>

Family ORIBATIDÆ.

Genus PELOPS C. L. Koch.

Mandibles long, styliform and terminating in minute chelæ ; abdomen sometimes pitted or sculptured and often provided with a rectangular projection from the anterior margin ; hairs of body spatulate.

Up to the present time only two species of this genus have been found in America. In Europe the genus is rich in species.

KEY TO SPECIES.

1. Abdomen with prominent spatulate hairs on its posterior aspect.

P. laticuspidatus sp. nov.

2. Abdomen hairless except for the large pair of anterior marginal hairs.

P. bifurcatus sp. nov.

Pelops laticuspidatus, new species. (Plate II, Figs. 1 and 2.)

Body chestnut brown ; legs paler than the body.

No projection from the anterior margin of the abdomen over the cephalothorax. Cephalothorax rather small ; as broad as long. Lamella as long as the cephalothorax, of about uniform width throughout. The anterior two fifths of the lamella is free and corresponds to the lamellar cusp of most species ; translamella about one half as broad as the lamellæ and about twice as long as it is broad ; prominent lateral lamellæ also present. The lateral lamellæ are triangular in shape, being pointed anteriorly and bearing a stout, curved pectinate bristle. Lamellar hairs three fourths as long as lamellæ, curved and finely pectinate. Pseudostigma slightly projecting ; pseudostigmatic organ with small, short peduncle and large subcapitate head, which is truncate at the end.

Abdomen subglobose ; pteromorphæ not projecting beyond the anterior margin of abdomen. Dorsum with several clavate hairs including two pairs situated at the tip ; the upper pair being about twice as long as the lower pair.

Anterior pair of legs almost as long as the body. Femur shorter than tibia. Ungues tridactyle; dactyles unequal.

Length, 0.42 mm.; breadth, 0.27 mm.

In moss. Collected by C. A. Hart at Pulaski, Ill.

Pelops bifurcatus, new species. (Plate II, Fig. 3.)

Reddish brown; integument smooth and shiny.

Cephalothorax as broad as long; lamellæ consisting of two long, narrow blades about as long as the cephalothorax, lying parallel to the median line and ending each in a sharp cusp which extends almost as far as the tip of the rostrum; translamella a chitinous ridge, incomplete in the middle. There is a small pair of lateral lamellæ curved inwards at the tip. Lamellar hairs short, about twice as long as the lamellar cusps, slightly pectinate and curved outwards; antero-lateral hairs twice as long as lamellar hairs, strongly curved as usual and pectinate on the external edge only. Pseudostigmatic organs clavate, directed forwards and about one half as long as the cephalothorax.

Abdomen globose; pteromorphæ truncate anteriorly and not extending beyond the anterior margin of abdomen, anterior free margin of pteromorphæ slightly concave. Rectangular projection present at the front margin of abdomen, extending twice as far in a transverse direction as in the longitudinal direction. From the anterior margin of the abdomen, on each side just inwards to the pseudostigmatic organs extend forwards two very large, flat setæ. The shape of these setæ is very characteristic of the species. Their general shape is spatulate but they are deeply bifid in front and have serrate margins. Abdomen otherwise hairless. Genital covers much smaller than the anal covers and situated about one and one half times their length in front of the latter.

Anterior pair of legs about one and one third times as long as the cephalothorax. Tarsus of leg I slightly longer than the tibia; tarsus and tibia of leg II subequal in length but the tibia is somewhat thickened at the distal end. Ungues tridactyle; dactyles unequal.

Length, 0.38 mm.; breadth, 0.30 mm.

Under logs. Collected by the writer at Havana, Ill. Two specimens.

Genus ORIBATA Latreille.

Hairs of body never spatulate; claws tridactyle; wings of abdomen never attached to any part of the cephalothorax; lamellæ attached by their inner margin to the dorsal surface of the cephalothorax.

The species of this genus are by far the most numerous of any of the genera of Oribatidæ.

KEY TO SPECIES.

Div. I. Pteromorphæ large, extending much beyond the anterior margin of the abdomen, always capable of being folded down so as to conceal almost completely the legs when the same are flexed.

Div. II. Pteromorphæ truncate anteriorly, not extending beyond the anterior margin of abdomen, and seldom capable of being folded over the flexed legs.

Div. I.

1. No true lamellæ present ; a pair of lateral lamellæ, very closely appressed to the dorso-vertex. (Subdiv. (a).)..... 2.
- Lamellæ blade-like. (Subdiv. (b).)..... *O. quadricuspidata* sp. nov.
2. With dorsal surface of cephalothorax sloping very markedly downward as you pass from the dorso-vertex to rostrum ; black species..... *O. nigra* sp. nov.
- Dorsal surface of cephalothorax not receding as you pass from the dorso-vertex to rostrum ; color brown..... 3.
3. Wings of abdomen large, two thirds as broad as the cephalothorax when viewed from above..... *O. macroptera* sp. nov.
- Wings of abdomen about one third as broad as the cephalothorax when viewed from above..... 4.
4. Wings of abdomen with wrinkles..... *O. rugosala* sp. nov.
- Wings of abdomen smooth..... *O. minuta* sp. nov.

***Oribata quadricuspidata*, new species. (Plate II, Figs. 4 and 5.)**

Light brown ; integument rather thin and brittle, surface smooth.

Cephalothorax about one third as long as the abdomen and very peculiar in possessing grooves for the reception of the lamellæ, which gives the dorso-vertex the appearance of projecting over the base of the lamellæ. Lamellæ prominent, almost as long as the cephalothorax and very deeply bifid in front, the inner cusps of the lamellæ extend about one half their length beyond the tip of the outer cusps. No translamella. Two pairs of lateral lamellæ, the inner pair is much the longest and is curved towards the median plane ; the outer pair is short and stout. Lamellar hairs long, slightly curved at the base ; interlamellar hairs similar to lamellar hairs, but straight and longer ; they are situated almost approximate to the posterior margin of cephalothorax ; anterior lateral hairs stout, curved and pectinate. Pseudostigmatic organs very large, clavate and directed forwards and towards the median plane. Palpi prominent.

Abdomen subglobose ; pteromorphæ triangular, truncate, not extending beyond the anterior margin of abdomen. Genital covers slightly smaller than anal covers and situated one and one half times their length in front of the latter. Abdomen hairless.

Legs rather small and bearing several stout, short, pectinate bristles. Ungues tridactyle.

Length, 0.32 mm.; breadth, 0.21 mm.

Under the bark of shell-bark hickory. Collected by J. D. Hood, at Urbana, Illinois. Two specimens.

***Oribata nigra*, new species. (Plate II, Fig. 6.)**

Body black ; legs and pteromorphæ brown. Integument thick and smooth.

The cephalothorax is peculiar in that the dorsal surface slopes downwards rapidly from the posterior part of the cephalothorax to the rostrum, the rostrum being much lower than the posterior dorsal surface of the cephalothorax. Lamellæ rudimentary ; translamella absent. Superior hairs situated laterally, long and curved

markedly inwards; anterior lateral hairs slightly shorter and somewhat stouter than the superior hairs; interlamellar hairs similar to superior hairs but smaller. Pseudostigmatic organ fusiform, about as long as the tarsus of leg I, serrate and very slightly curved.

Abdomen subglobose; pteromorphæ large and projecting forwards beyond the middle of the cephalothorax, the anterior free edge appearing rounded from above; in ventral aspect the anterior edge of the pteromorphæ is emarginate. Abdomen hairless.

Legs short; anterior pair about two thirds as long as abdomen; tibia and tarsus of leg I subequal. The legs are clothed with many simple bristles, also with a few short, stout, curved, pectinate bristles, which are situated on the inner side. Ungues large, tridactyle; dactyles equal.

Length, 0.78 mm.; breadth, 0.62 mm.

Under a large stone. Collected by the writer at Batavia, Ill. Two specimens.

Oribata macroptera, new species. (Plate II, Fig. 7.)

Body dark reddish brown; wings and legs light brown.

No true lamellæ present but a pair of lateral lamellæ closely appressed to sides of cephalothorax. Superior bristles straight, pectinate, about one half as long as the cephalothorax; antero-lateral bristles about as long as the superior bristles, curved as usual but apparently simple. Pseudostigmatic organ subfusiform, recurved, pectinate, about as long as tibia of leg I.

Abdomen broadly rounded posteriorly; anterior one half of lateral margin, where the pteromorphæ are attached, straight. Pteromorphæ large, broad, extending almost to the tip of the cephalothorax, rounded anteriorly, posterior dorsal margin notched. Abdomen hairless. Genital covers about three fifths as long as the anal covers and situated twice their length in front of the latter; anal covers situated about one third their length from the posterior margin of the ventral plate.

Anterior pair of legs as long as the body; tarsus one and one half times as long as the tibia; genual almost equal to the tibia in length. Ungues tridactyle; dactyles unequal.

Length, 0.56 mm.; breadth, 0.39 mm.

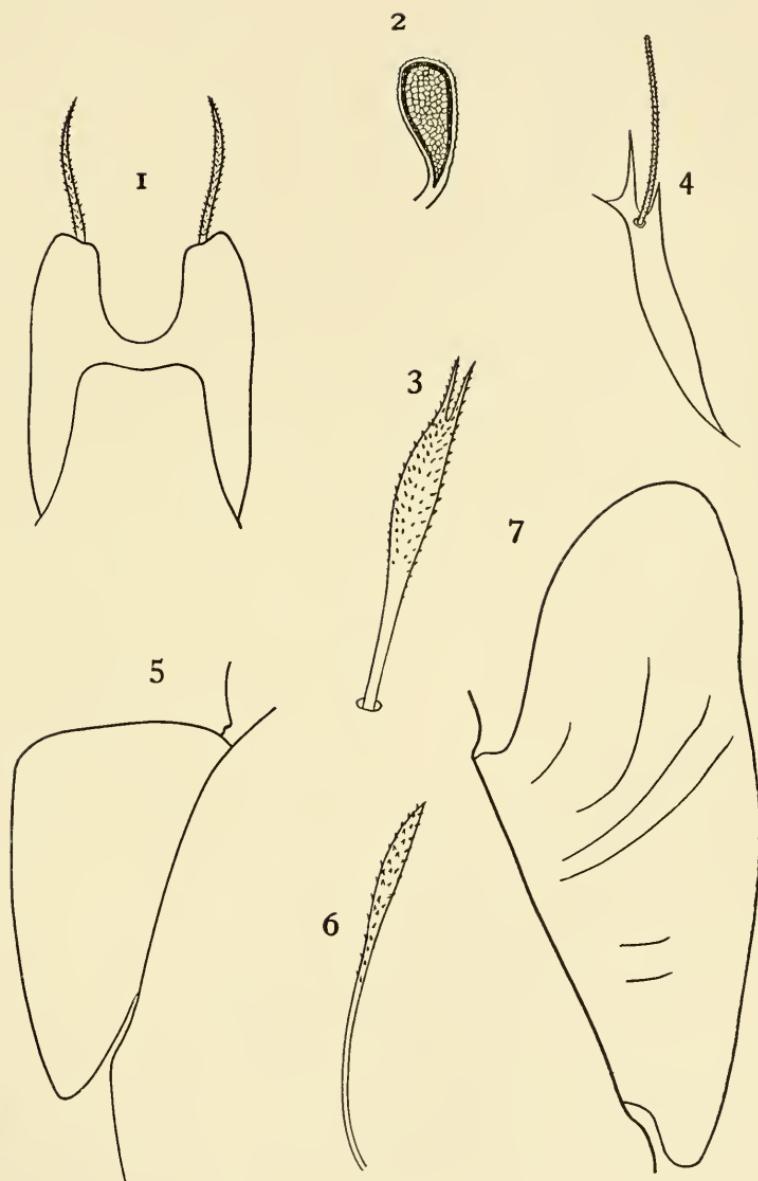
In sweepings from grass. Collected by C. A. Hart at Brownsville, Tex. Several specimens.

This species is related to *O. texana* Banks and *O. depressa* Banks but differs from the former in the length of the anterior pair of legs and in the shape of the pseudostigmatic organs and from the latter in the size of the wings and in the width of the body.

Oribata rugosala, new species. (Plate III, Fig. 8.)

Chestnut brown; integument of abdomen smooth, of wings wrinkled (hence the name, *rugosa*, wrinkled + *ala*, wing).

Cephalothorax short and broad; no lamellæ or translamella; antero-lateral hairs curved and pectinate as usual. There is a single pair of hairs upon the dorsal surface



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of the cephalothorax near the posterior margin, erect, short and very slightly pectinate. Pseudostigmatic organ of medium length, clavate, recurved and slightly barbed.

Abdomen as broad as long; hairless. Genital covers rectangular, one and one half times their length in front of the much larger anal covers.

Tarsus of leg I slightly longer than the tibia. Claws tridactyle; dactyles unequal.

Length, 0.56 mm.; breadth, 0.43 mm.

Under bark of a tree standing in the water, at the mouth of Spoon River, Ill.

This species is related to *Q. macroptera*, but differs from it in having a shorter and stouter pedicel to the pseudostigmatic organ, in having much shorter tarsi for legs I and in not having the distal end of the tibia of leg I swollen. It is also related to *O. robusta* Banks, but differs from it in size, being much smaller; in not having the four prominent bristles on the posterior margin of abdomen and in having the superior bristles of cephalothorax much shorter.

Oribata minuta, new species. (Plate III, Figs. 9 and 10.)

Light brown; integument rather thin, surface smooth.

Cephalothorax broad and short. Lamellæ situated laterally and adhering closely to the cephalothorax. Dorso-vertex bearing a single pair of short, straight hairs, situated near the posterior margin of the cephalothorax. Pseudostigmatic organ with a rather long, recurved peduncle and an enlarged, long, tapering, serrate head.

Abdomen subglobose. Pteromorphæ two thirds as long as abdomen, rounded in front and extending beyond the middle of the cephalothorax. Genital covers two thirds as long as anal covers and situated about one and one half times their length in front of the anal covers. Abdomen hairless.

Legs of medium size; femur enlarged. Ungues tridactyle.

Length, 0.35 mm.; breadth, 0.24 mm.

Under old boards. Collected by author, Arcola, Illinois. Three specimens.

Div. II.

- | | |
|---|------------------------------|
| 1. With a translamella. (Subdiv. (a).) | <i>O. latincisa</i> sp. nov. |
| Without translamella. (Subdiv. (b).) | 2. |
| 2. Pseudostigmatic organ large, with a straight, simple posterior margin and a convex, pectinate anterior margin..... | <i>O. helvina</i> sp. nov. |
| Pseudostigmatic organ smaller, clavate and simple..... | <i>O. enodis</i> sp. nov. |

Oribata latincisa, new species. (Plate III, Fig. 11.)

Dark reddish brown; legs yellowish brown.

Cephalothorax as broad as long. Lamellæ almost as long as cephalothorax, broadest at the anterior part where they end in large bilobed cusps; translamella a narrow blade on edge, one third as broad as long; lateral lamellæ present, crescent- or sickle-shaped and not quite reaching to tips of lamellar cusps. Prominent tecto-

pedia are present for the anterior pair of legs. Lamellar hairs straight and pectinate, three fourths as long as the lamellæ; hair of lateral lamella strongly curved and pectinate on outer margin, slightly shorter than the lamellar hairs; interlamellar hairs long, slightly curved and pectinate, slightly longer than lamellar hairs. Pseudostigmatic organs short, subcapitate.

Abdomen about four fifths as broad as long; pteromorphæ truncate anteriorly and not extending beyond the anterior margin of abdomen. Dorsum with several short, stiff, straight bristles. Genital covers smaller than the anal covers and situated about one and one half times their length in front of the latter; anal covers broadest at their posterior ends and situated about one half their length from the posterior margin of the ventral plate.

Anterior pair of legs three fifths as long as the body. The tibiae and genua of legs I and II each bear on their outer sides a large, stout, pectinate spine or bristle. Ungues tridactyle; dactyles unequal.

Length, 0.70 mm.; breadth, 0.50 mm.

Under a log. Collected by the writer at Urbana, Ill. A single specimen.

Oribata helvina, new species (Plate III, Figs. 12 and 13.)

Light yellow.

Cephalothorax two thirds as broad as long; lamellæ narrow, of uniform width, about two thirds as long as cephalothorax; no translamella. Lamellar hairs straight, as long as the lamellæ; interlamellar hairs equal to lamellar hairs; anterior lateral bristles two thirds as long as the lamellar hairs, pectinate, strongly curved and extending one half their length beyond the tip of the rostrum. Pseudostigmatic organs large, clavate and barbed on the anterior margin, posterior margin without barbs. The pseudostigmatic organs are as long as the lamellæ.

Abdomen two thirds as broad as long. Pteromorphæ one half as long as abdomen, truncate anteriorly and not extending beyond the anterior margin of abdomen. Genital covers small, two thirds as long as the anal covers and situated twice their length in front of the latter. Anal covers situated almost approximate to the posterior margin of abdomen. Abdomen hairless.

Legs subequal; anterior pair two thirds as long as the body; tarsus and tibia subequal; genual one half as long as tibia. Ungues tridactyle; dactyles unequal.

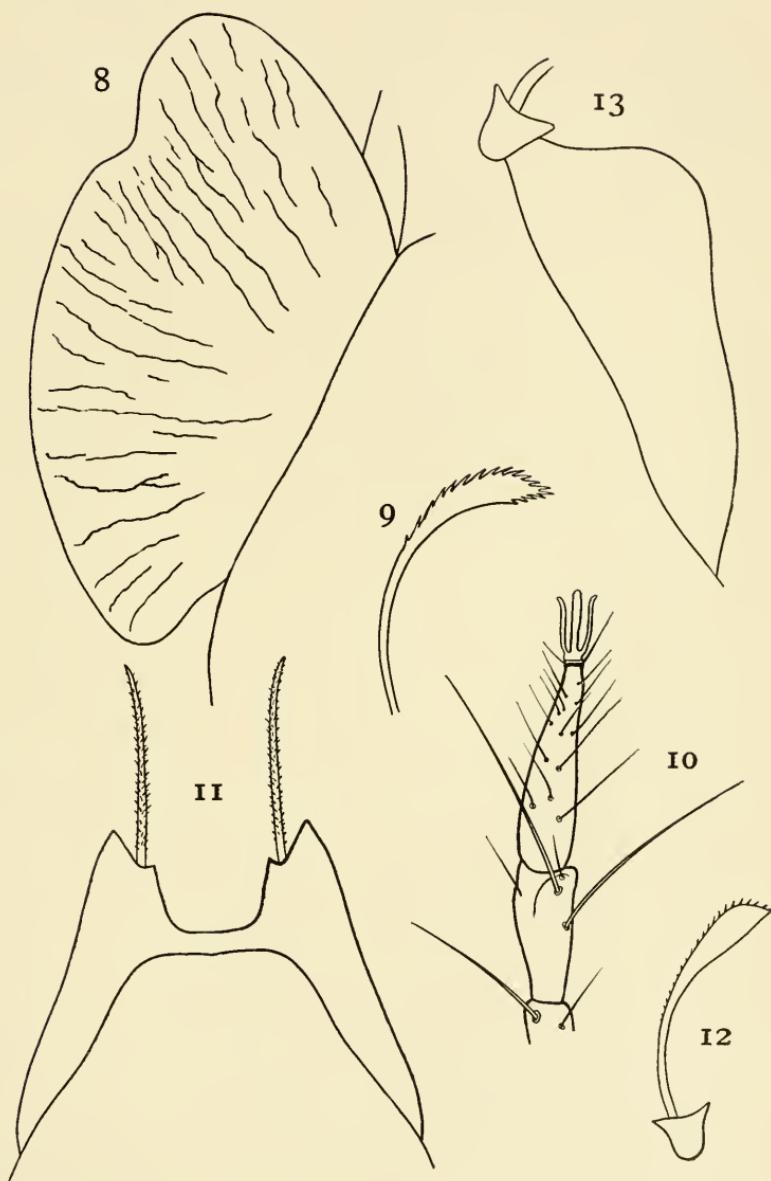
Length, 0.38 mm.; breadth, 0.22 mm.

From dead leaves. Collected by the writer at Urbana, Illinois. Three specimens.

Oribata enodis, new species. (Plate IV, Fig. 14.)

Light brown; integument of medium thickness; surface smooth.

Cephalothorax about one third as long as abdomen; lamellæ long and narrow, about three fifths as long as the cephalothorax, anterior end free and bearing a large, pectinate bristle about two thirds as long as the lamella itself. There is a pair of lateral lamellæ which are slightly longer than the median lamellæ and are curved anteriorly towards the median plane. Interlamellar hairs similar to lamellar hairs but



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longer and slightly curved. There is a lateral pair of bristles situated just below the anterior end of the lateral lamellæ. They are large, curved, pectinate and inclined towards the median plane. Pseudostigmatic organ with short peduncle and large, oblong, clavate head.

Abdomen two thirds as broad as long; pteromorphæ truncate, not extending beyond the anterior margin of abdomen. Genital covers two thirds as long as anal covers and situated about one and one half times their length in front of the latter.

Legs of medium size; tarsus and tibia subequal; femur subglobose. Ungues tridactyle. The legs bear many rather short, curved, pectinate bristles.

Length, 0.35 mm.; breadth, 0.22 mm.

Under logs. Collected by the author, Urbana, Illinois. One specimen.

Genus ORIBATELLA Banks.

Without spatulate hairs; body never pitted; wings of abdomen never attached to cephalothorax; lamellæ large and attached to the dorso-vertex by their posterior margins only.

This genus is rich in species in this country but in Europe is not so well represented.

Oribatella magniseta, new species. (Plate IV, Fig. 15.)

Black; integument thick and reticulate.

Cephalothorax one third as long as abdomen; lamelæ very large, almost completely obscuring the cephalothorax, attached by the posterior margin only, bifid in front. The anterior pair of lamellar cusps are as long as the rest of the lamellæ and extend beyond the tip of the rostrum. Lateral lamellæ very broad, truncate in front and not extending beyond the middle of the cephalothorax. No translamella. Lamellar hairs long, straight, slightly pectinate, and as long as the lamellæ from which they extend. Interlamellar hairs erect and equal to lamellar hairs; anterior lateral hairs two thirds as long as lamellar hairs, much curved and strongly pectinate. Pseudostigmatic organ erect, elongo clavate, pectinate.

Abdomen subglobose; pteromorphæ two thirds as long as the abdomen, slightly pointed in front, but not extending beyond the anterior margin of the abdomen. Genital covers equal to anal covers and situated twice their length in front of the latter. The dorsum of abdomen has on each side eleven enormous, straight, slightly pectinate bristles; three along the margin of attachment of the pteromorphæ with the abdomen, four in a longitudinal row near the median plane, and four situated on the posterior latero-dorsal aspect.

Legs of moderate length and bearing conspicuous, curved, dentate bristles. Ungues tridactyle.

Length, 0.72 mm.; breadth, 0.56 mm.

Under stones. Collected by myself at Dunning, Illinois. Several specimens.

Family NOTHRIDÆ.

Genus **LIACARUS** Michael.

Body not sculptured nor pitted; last three pairs of legs inserted under the body; with lamellæ; claws tridactyle.

KEY TO SPECIES DESCRIBED.

1. Pseudostigmatic organ with the enlarged part or head situated as usual at the distal end of the same..... 2.
Pseudostigmatic organ with enlarged part near the base, the distal portion flagellate. *L. latus* sp. nov.
2. Pseudostigmatic organ with very long filiform head equal in length to the pedicel from which it extends..... *L. glaber* sp. nov.
Head of pseudostigmatic organ clavo-lanceolate and about one half as long as the pedicel from which it arises..... *L. magnilamellatus* sp. nov.

Liacarus latus, new species. (Plate IV, Fig. 16.)

Very dark brown; surface of integument smooth.

Cephalothorax triangular, as broad as long; lamellæ large, of about equal width throughout their length, as long as the cephalothorax, bifid in front, anterior one third free; translamella a narrow blade about one fourth as broad as the lamella; no lateral lamellæ. Interlamellar hairs very short, straight, stout and erect, situated at the bases of the lamellæ; lamellar hairs similar to interlamellar hairs, situated at the bottom of notch in the anterior margin of lamellæ, directed slightly towards the median plane; anterior lateral hairs small, straight and inclined markedly towards the median plane. Pseudostigmatic organs elongate, swollen at the base with the remaining parts spine-like, about one half as long as the tarsus of leg I.

Abdomen globose. Genital covers about one and one half times their length in front of the much larger anal covers. Anal covers subrectangular, each one half as broad as long and situated almost approximate to the posterior margin of ventral plate; ventral plate circular. Abdomen hairless.

Legs small; anterior pair about one half as long as the abdomen; tibia longer than tarsus; tarsus I broad at distal end. Posterior legs somewhat longer than the others. Legs well clothed with rather long hairs. Ungues tridactyle; dactyles equal.

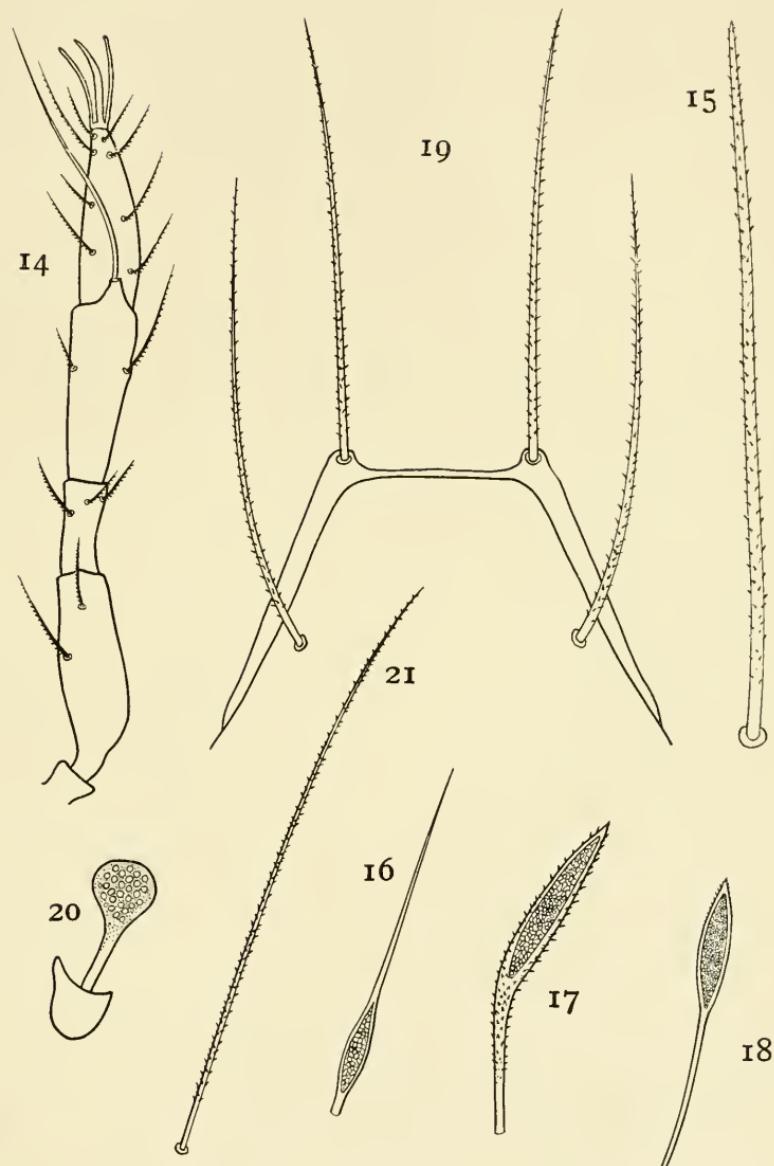
Length, 1.09 mm.; breadth, 0.70 mm.

In moss. Collected by the writer at Urbana, Illinois. Two specimens.

Liacarus glaber, new species. (Plate IV, Fig. 17.)

Brown; integument thick, surface smooth.

Cephalothorax triangular; lamellæ almost as long as cephalothorax and of equal breadth throughout. Lamellar hairs short, about one third as long as lamellæ; interlamellar hairs erect and similar to lamellar hairs. Palpi prominent. Pseudostigmatic organs long and recurved, with a small peduncle and an elongated, long, clavate head.



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Abdomen oblong, two thirds as broad as long. Anal covers about twice as large as genital covers, and situated almost approximate to the posterior margin of ventral plate. Abdomen hairless.

Anterior pair of legs extending about one third their length in front of the tip of rostrum. Tibia and tarsus subequal. Ungues tridactyle. Legs clothed with many rather small hairs.

Length, 0.67 mm.; breadth, 0.43 mm.

Under a stone. Collected by myself at Dunning, Illinois. One specimen.

Liacarus magnilamellatus, new species. (Plate IV, Fig. 18.)

Pale yellowish brown; cephalothorax darker than the abdomen.

Cephalothorax triangular, as broad as long. Lamelle very large and obscuring much of the cephalothorax; each lamella is of almost uniform width throughout its length and the two fuse together at their anterior ends on the median line, so that no true translamella exists. Lamellar hairs straight, pectinate, about three fifths as long as the lamellæ; interlamellar hairs similar to lamellar hairs but larger and slightly curved. Pseudostigmatic organ with a long, slender, straight peduncle and a broad lanceolate head.

Abdomen oval, four fifths as broad as long. Genital covers shorter but broader than the anal covers, situated about one and one third times their length in front of the latter; anal covers situated about one half their length from the posterior margin of ventral plate. Dorsum of abdomen hairless.

Anterior pair of legs almost as long as the abdomen. The hind pair of legs are the stoutest.

Length, 0.51 mm.; breadth, 0.37 mm.

In rubbish. Collected by C. R. Crosby at Columbia, Mo. A single specimen.

Genus NOTASPIS Herm.

Body smooth; with lamellæ; legs inserted at the sides of the body; mandibles chelate.

KEY TO SPECIES.

1. With translamella.....2.
- Without translamella.....4.
2. Anterior pair of legs extending fully one half their length beyond the tip of the rostrum.....3.
- Tarsus only of first pair of legs extending beyond the tip of the rostrum.
N. depilis sp. nov.
3. Translamella fully as broad as lamellæ.....*V. brevisetosa* sp. nov.
Translamella a mere line.....*N. texana* sp. nov.
4. Pseudostigmatic organ with sub-capitite head.....*N. pallida* sp. nov.
Pseudostigmatic organ with clavo-lanceolate head.....5.
5. Lamella very large, blade-like.....*N. lamellata* sp. nov.
Lamellæ small, lateral, consisting of a chitinous ridge.....*N. minuta* sp. nov.

Notaspis depilis, new species. (Plate IV, Fig. 19.)

Of a uniform dark yellowish brown color.

Cephalothorax cone-shaped. Lamellæ one half as long as the cephalothorax, very narrow, broadest at the anterior ends; translamella a mere line. Lamellar hairs long, straight, pectinate, longer than the lamellæ; interlamellar hairs similar to lamellar hairs; antero-lateral hairs slightly shorter than the lamellar hairs. Pseudostigmatic organ short, capitate.

Abdomen almost as broad as long; dorsum without hairs. Genital covers two thirds as long as anal covers and situated fully twice their length in front of the latter; anal covers subrectangular, one half as broad as long, situated almost approximate to the posterior margin of ventral plate. On the posterior ventral surface of the abdomen are two pairs of hairs.

Anterior pair of legs about three fifths as long as the body; tibia longer than the tarsus. The posterior pair of legs are the longest. Ungues tridactyle, situated on tarsal pedicels; dactyles subequal.

Length, 0.53 mm.; breadth, 0.34 mm.

On peaches infested with *Circulio*, feeding on the exuded sap of the fruit. Collected by L. M. Smith at Metropolis, Ill. Several specimens.

Notaspis brevisetosa, new species. (Plate IV, Fig. 20.)

Light brown; integument smooth.

Lamellæ slightly over one half as long as the cephalothorax, without cusps, broader at the anterior end than at the posterior end; translamella of uniform width for its whole length, being about as broad as the distal end of the lamellæ. Lamellar hairs straight, strongly barbed and about three fourths as long as the lamellæ; interlamellar hairs similar to lamellar hairs; antero-lateral hairs slightly curved, pectinate and extending one half their length in front of the tip of the rostrum. Pseudostigmatic organ capitate, about three fourths as long as femur of leg I.

Abdomen oblong; with four longitudinal rows of short, pectinate bristles, including about six bristles in each row. Genital covers each about twice as long as broad and situated one and one half times their length from the anal covers; anal covers touching the posterior margin of ventral plate.

Anterior pair of legs about equal to the abdomen in length, tarsus less than tibia, tibia with a long tactile hair springing from a tubercle at its distal end. Ungues tridactyle; dactyles unequal.

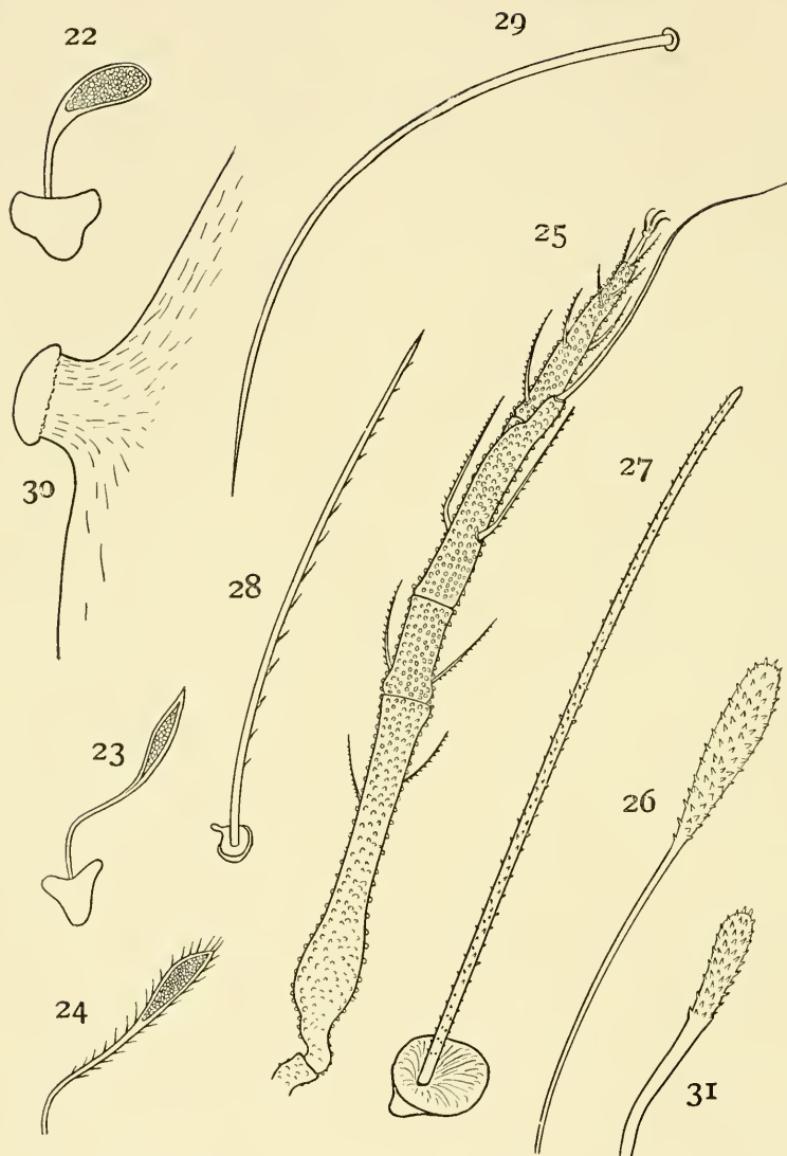
Length, 0.37 mm.; breadth, 0.21 mm.

Shaken from limbs of black walnut, at Topeka, Ill. One specimen.

Notaspis texana, new species. (Plate IV, Fig. 21.)

Chestnut brown.

Cephalothorax as broad as long. Lamellæ narrow blades on edge, three fourths as long as the cephalothorax, broadest at the anterior end; translamella a mere line; lateral lamellæ very small. Lamellar hairs long, straight, pectinate, equal to the lamellæ in length; interlamellar hairs similar to the lamellar hairs but slightly longer;



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antero-lateral hairs but slightly curved, almost as long as the lamellar hairs. Pseudostigmatic organ small, subcapitate.

Abdomen subglobose. Dorsum with a very few minute, rudimentary hairs. Genital covers much smaller than the anal covers and situated fully twice their length from the latter; anal covers approximate to posterior margin of ventral plate.

Anterior pair of legs about as long as the body. Tarsus of leg I shorter than the tibia; genual one third as long as the tibia. Ungues tridactyle; dactyles subequal.

Length, 0.67 mm.; breadth, 0.45 mm.

In sweepings from grass. Collected by C. A. Hart at the southern end of Padre Island, Texas. Many specimens.

This species is related to *N. depilis* but differs in the following points: the lamellæ are longer than in *N. depilis*, the body is larger and darker in color, and the legs are longer.

Notaspis pallida, new species. (Plate V, Fig. 22.)

Reddish brown; legs lighter than the body.

Cephalothorax longer than broad. Lamellæ a little over one half as long as the cephalothorax. They are very narrow and are of about uniform width throughout. Lateral lamellæ indicated by a slight chitinous ridge. Lamellar hairs almost straight, pectinate, as long as the lamellæ themselves; interlamellar hairs similar to lamellar hairs, erect and situated near the posterior margin of the cephalothorax; anterior lateral hairs strongly curved and about three fifths as long as the lamellar hairs. Pseudostigmatic organ with recurved peduncle and large, clavate head.

Abdomen three fourths as broad as long. From the shoulders there is a small chitinous expansion which indicates a relationship to the *Pterogasteræ*. Abdomen with about two dozen rather long bristles mostly situated around the margin. Genital covers much smaller than the anal covers, each about one half as broad as long; anal covers situated a little over their length from the genital covers and about one fourth their length from the posterior margin of ventral plate.

Tarsus and tibia of leg I subequal; genual one half as long as the tibia. Ungues tridactyle; dactyles unequal.

Length, 4.48 mm.; breadth, 0.30 mm.

In moss. Collected by the writer at Urbana, Ill. Two specimens.

Notaspis lamellata, new species. (Plate V, Fig. 23.)

Very light yellowish brown.

Cephalothorax as broad as long. Lamellæ three fourths as long as the cephalothorax, much broader in the middle than at either end; no translamella or lateral lamellæ. Lamellar hairs straight, pectinate, about one half as long as the lamellæ; interlamellar hairs small, erect, about three fourths as long as the lamellar hair; antero-lateral hair but slightly curved and situated near the median line. This species is rather peculiar in possessing a pair of hairs upon the rostrum slightly in front and inside of the lamellar cusps; rostral hairs almost equal to lamellar hairs. Pseudostigmatic organ with slender recurved peduncle and sublanceolate head.

Abdomen broadly pointed posteriorly. Dorsum with a few fine hairs. Genital covers much smaller than anal covers and situated about one and one half times their length in front of the latter; anal covers each about one half as broad as long and situated almost approximate to the posterior margin of ventral plate.

Anterior pair of legs almost as long as the abdomen. Tarsus and tibia of leg I subequal in length; genual three fifths as long as the tibia. Ungues monodactyle; about one third as long as tarsus.

Length, 0.42 mm.; breadth, 0.27 mm.

In rubbish. Collected by C. R. Crosby at Columbia, Mo. Three specimens.

Notaspis minuta, new species. (Plate V, Fig. 24.)

Light yellowish brown; surface of integument almost smooth.

Cephalothorax large, one half as long as abdomen. Lamellæ small and indistinct, extending only a short distance in front of the pseudostigmata. No translamella. Dorso-vertex hairless. There is a pair of small, curved bristles at the tip of the rostrum. Pseudostigmatic organ very large, about two thirds as long as the cephalothorax, with a long, thin peduncle and a large, long, markedly pectinate head.

Abdomen oblong, almond-shaped. Dorsum of abdomen with a few fine hairs around the margin. Ventral plate shield-shaped, it does not extend over the anterior one fourth of the ventral surface of abdomen. Genital covers twice as long as broad and situated in approximation to the anterior margin of ventral plate. Anal covers much larger than the genital covers and situated about one and one fourth times their length behind the latter, and one fourth their length from the posterior margin of the ventral plate.

Legs large; anterior pair longer than abdomen. Tarsus slightly longer than tibia. Femur and coxa of leg III enlarged. Ungues tridactyle.

Length, 0.29 mm.; breadth, 0.14 mm.

Under old pieces of timber. Collected by the author at Arcola, Illinois. Two specimens.

Genus DAMÆUS C. L. Koch.

Ventral plate ankylosed to dorsal plate; mandibles chelate; without lamellæ; legs thin, usually with swollen or globose segments, and much longer than the body.

Div. I. Abdomen round or subglobose; legs about twice as long as the body and with some of the segments moniliform.

Div. II. Abdomen oblong; legs less than twice as long as the body; segments of the legs but slightly swollen.

Div. I.

Only the two proximal segments of the legs swollen; second pair of legs much shorter than the rest; tibia of leg I bearing a large tubercle distally from which springs a very large tactile bristle. (Subdiv. (a).).....*D. magnisetosus* sp. nov.

All the segments of the legs with a swollen portion; second pair of legs subequal to the preceding or succeeding pair; no prominent tubercle on distal end of tibia of leg I. (Subdiv. (b).).....*D. michaeli* sp. nov.

Damæus magnisetosus, new species. (Plate V, Figs. 25 and 26.)

Chestnut brown.

Cephalothorax large, fully two thirds as long as the abdomen and about three fourths as wide as the same. Pseudostigma cup-shaped, projecting; pseudostigmatic organ very large and long, fully one half as long as leg II, head clavate and pectinate. Antero-lateral hairs stout and very curved. There are prominent tectopedia for the first two pairs of legs.

Abdomen as broad as long; dorsum with a few short, stout, curved bristles. Genital covers as broad as anal covers but not so long, separated from the anal covers by a very narrow chitinous band; anal covers situated about one third their length from the posterior margin of ventral plate. Ventral plate circular, as broad as long.

First pair of legs as long as the body; second pair about three fourths as long as the first pair; third pair equal to the first, and the last pair of legs the longest of all. Tarsus of leg I shorter than the tibia. The tibia of leg I is peculiar in this species in that it possesses a large process or tubercle at its dorsal distal aspect from which arises a large, long tactile hair. Ungues tridactyle, situated on very long and slender tarsal pedicels; dactyles unequal.

Length, 0.53 mm.; breadth, 0.35 mm.

In moss. Collected by C. A. Hart at Pulaski, Ill., and by the writer at Arcola, Ill.

This species is remarkable in possessing such large pseudostigmatic organs and the bristle bearing tubercle on the tibia of legs I, also in length of the second pair of legs which are much shorter than the other pairs.

Damæus michaeli, new species. (Plate V, Fig. 27.)

Chestnut brown; integument brittle, surface almost smooth.

There is a deep constriction between the cephalothorax and the abdomen; pseudostigmata funnel-shaped; pseudostigmatic organ longer than the cephalothorax, pectinate and flagelliform, projecting almost at right angles to the margin of the body; two pairs of curved rostral hairs.

Abdomen globular with a curved row of large, curving, pectinate bristles on the posterior margin. Anal and genital covers subequal, separated by about one half their length.

Legs stout; femora with narrow peduncle and large clavate head; each segment bears several stout, curved, pectinate bristles. Portions of cast skin generally carried on the dorsum of the abdomen.

Length, 0.54 mm.; breadth, 0.32 mm.

In moss and under bark of logs. Collected by myself, Homer, Illinois. Many specimens.

Div. II.

- Pseudostigmatic organ very long, filiform *D. rigidus* sp. nov.
Pseudostigmatic organ short, subcapitate *D. magnipilosus* sp. nov.

***Damæus rigidus*, new species. (Plate V, Fig. 28.)**

Reddish brown.

Cephalothorax three fifths as long as the abdomen; broadest above the attachment of the anterior pair of legs. Superior bristles small, straight, less than one third as long as the cephalothorax; antero-lateral bristles slightly larger than the superior bristles, markedly curved and pectinate on the outer margin. Pseudostigmatic organ very large, long and bristle-like, pectinate, about equal to the cephalothorax in length.

Abdomen oval, smooth and polished. Dorsum with a submedian row of four curved, minutely pectinate bristles on each side and also with two pairs of bristles situated laterally and a row of six very small, almost straight bristles around the posterior margin, the inner pair being the largest.

Anterior pair of legs as long as the body. Tarsus of leg I longer than the tibia; genua scarcely one half as long as the tibia. All the legs moniliform. Coxa of leg III much swollen. All the legs bear several stout, curved, pectinate bristles; tibiae of legs I and II each have a distal, tactile hair about as long as the segment itself.

Length, 0.46 mm.; breadth, 0.26 mm.

In moss. Collected by L. M. Smith at Parker, Ill. Several specimens.

***Damæus magnipilosus*, new species. (Plate V, Fig. 29.)**

Olive brown; surface of integument slightly rough.

Cephalothorax slightly longer than broad; two pairs of rostral hairs present, the anterior pair being about two thirds as long as the posterior pair, and posterior pair about three fifths as long as the femur of leg I; two pairs of larger bristles are situated on the dorso-vertex close to the pseudostigmata; one pair just inwards to the same and the other pair just lateral to the pseudostigmata. Pseudostigmata cylindrical but low; pseudostigmatic organs rather small, almost erect, with small peduncle and globose head.

Abdomen oval, three fifths as broad as long; dorsum clothed with about two dozen large, curved, simple bristles, those on the posterior part smaller than those on the anterior part. At the posterior margin of the abdomen are situated two pairs of short, stout, fusiform bristles, characteristic of this species; the upper two are about twice as long as the lower two, and both pairs are inclined away from the median plane. Ventral plate shield-shaped; genital covers contiguous with the anterior margin of the ventral plate, each being about twice as long as broad; anal covers larger than genital covers and situated about their length from the latter, and about one third their length from the posterior margin of the ventral plate.

Anterior pair of legs about as long as the entire body of the mite. In this species the segments of the legs are not swollen so much as in other species of the same genus. The femur of leg I is about equal to the cephalothorax in length; tarsus

longer than tibia. All the legs are clothed with rather stout, slightly curved pectinate bristles. The posterior pair of legs are the longer.

Length, 0.74 mm.; breadth, 0.42 mm.

Under bark of soft maple. Collected by J. D. Hood at Urbana, Illinois. Many specimens.

Genus HERMANNIA Nic.

Abdomen not segmented; dorsum of abdomen convex; not carrying nymphal skins; genital covers separate from anal covers; ventral plate present.

The single species described in this paper is one of three to possess a peculiar tubular projection on each side of the abdomen, the function of which according to Michael is excretory.

Hermannia subnigra, new species. (Plate V, Figs. 30 and 31.)

Dark yellowish brown; integument thick and tuberculate.

Cephalothorax pyramidal. Three pairs of bristles above; the superior bristles, rostral bristles and antero-lateral bristles. Superior bristles very stout, recurved and pectinate; rostral bristles similar to superior bristles; antero-lateral bristles strongly curved but not so stout as the rostral bristles. Pseudostigma cup-shaped, projecting; pseudostigmatic organ slightly recurved, clavate and about three fourths as long as the femur of leg I.

Abdomen broadly rounded posteriorly and peculiar in possessing on each side, above the posterior pair of legs, an excretory tube. Excretory tube two thirds as broad as long and with a projecting, recurved chitinous rim around the distal margin. Dorsum of abdomen with four longitudinal rows of five bristles each and a few other bristles around the margin of abdomen. Ventral plate shield-shaped, two thirds as broad as long; genital covers about two thirds as long as anal covers and situated one half their length from the latter; anal covers over twice as long as broad; both anal and genital covers tuberculate.

Anterior pair of legs about as long as the abdomen; tarsus longer than tibia; genual one half as long as tibia and as broad as long. Ungues monodactyle.

Length, 0.56 mm.; breadth, 0.38 mm.

Under logs and in trash. Collected by C. R. Crosby at Columbia, Mo., and by the writer at Mahomet, Ill. Many specimens.

Genus NOTHRUS C. L. Koch.

Abdomen not segmented; dorsal surface of abdomen flat or concave, never carrying nymphal skins; without tectopedia.

Nothrus quadripilus, new species. (Plate VI, Fig. 32.)

Uniform chestnut brown; dorsal surface of the body reticulate, the dorsum of the abdomen being more coarsely reticulate than the dorso-vertex of cephalothorax.

Cephalothorax longer than broad and very much narrowed at the insertion of the first pair of legs. Pseudostigma projecting; pseudostigmatic organ clavate and slightly recurved, a little over one half as long as the femur of leg II. There is situated very near the pseudostigma on its inner side a very long, simple bristle, as long as the cephalothorax itself.

Abdomen rectangular, but the anterior, lateral and posterior margins are all slightly convex. This species is peculiar and remarkable in possessing on its posterior margin four long, stout, slightly curved, simple and subequal bristles, each being almost as long as the width of the abdomen at its posterior margin. Ventral plate long and narrow, deeply emarginate just opposite the anterior end of the anal covers; genital covers when taken together are broader than long, situated approximate to anal covers; anal covers very long and narrow, about one sixth as broad as long.

Legs stout; leg I three fifths as long as the body. Tarsus of leg I but slightly longer than the tibia; tibia and genual subequal. Ungues stout, monodactyle.

Length, 0.82 mm.; breadth, 0.38 mm.

In trash. Collected by C. R. Crosby at Columbia, Mo. Many specimens.

Genus HYPOCHTHONIUS C. L. Koch.

Ventral plate ankylosed to dorsal plate; without lamellæ; legs stout; abdomen with a transverse suture or sutures, as if segmented.

This is the first new species of this rare genus to be discovered in America.

***Hypochthonius crosbyi*, new species. (Plate VI, Fig. 33.)**

Alcoholic specimens light yellowish brown.

Cephalothorax one and one half times as long as broad and three fifths as long as abdomen. The cephalothorax bears dorsally two pairs of bristles, a small curved pair at the tip of the rostrum and a larger, almost straight pair between the pseudostigmata. Pseudostigma low, cylindrical; pseudostigmatic organ long, flagelliform, simple, almost as long as the cephalothorax. Palpi prominent.

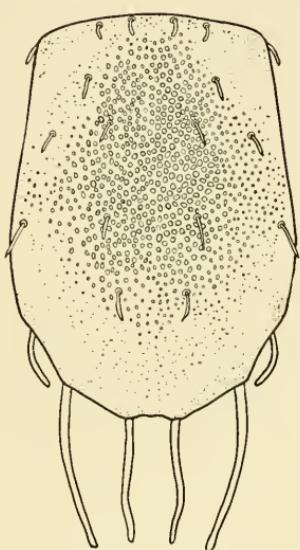
Abdomen with two transverse sutures. The anterior suture is situated about one fourth the length of the abdomen from the anterior margin of the same, while the posterior, which is the longest, is situated almost in the middle of the abdomen. Genital covers very large, triangular, about two thirds as long as the posterior pair of legs and one third as long again as the anal covers; anal covers long and narrow, truncate anteriorly reaching from the genital covers to the posterior margin of abdomen, inner margins concave, outer convex.

Anterior pair of legs slightly longer than the cephalothorax. Tarsus of leg I almost twice as long as tibia; tibia and genual equal. The tibia of leg I bears a very long, tactile bristle, about as long as leg I itself. Ungues monodactyle.

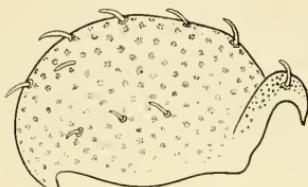
Length, 0.38 mm.; breadth, 0.22 mm.

In trash. Collected by C. R. Crosby at Columbia, Mo. Several specimens.

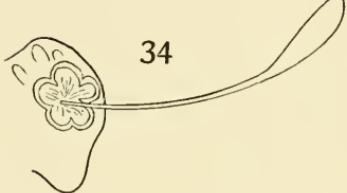
32



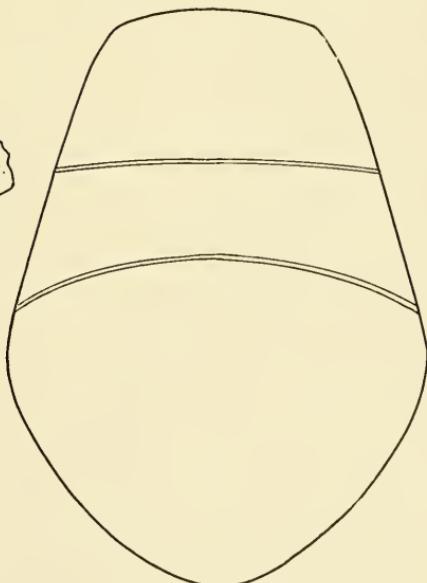
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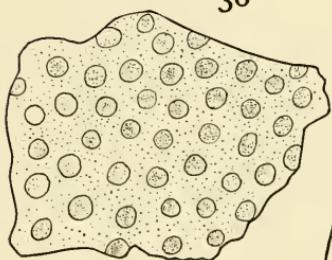
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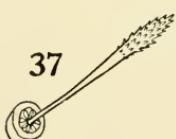
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36



37



H.E. Ewing, del.

Oribatoidea.

Family HOPLODERMIDÆ.

Genus PHTHIRACARUS Perty.

Unguis tridactyle; genital covers coalescing with anal covers.

Phthiracarus fulvus, new species. (Plate VI, Fig. 34.)

Light yellowish brown. Integument thick and uneven.

Cephalothorax three fifths as long as abdomen and about three fifths as high as long. There are three pairs of prominent bristles situated on the dorsal surface of the cephalothorax, which increase in length from the anterior pair backwards. These bristles when examined under high power are seen to be slightly pectinate. Pseudostigma five-lobed, with radiating furrows, situated about two fifths of the length of the cephalothorax from the posterior margin of the same and about the diameter of the organ itself from the ventral margin of the cephalothorax; pseudostigmatic organ moderately clavate, directed forwards and about as long as the femur of leg I.

Abdomen pointed posteriorly, about three fifths as high as long. The dorsum bears on each side three longitudinal rows of five stout, slightly curved bristles each and three other similar bristles situated on the antero-ventral aspect.

Anterior pair of legs slightly longer than the cephalothorax. Ungues stout, about as long as the tarsi from which they extend.

Length, 0.67 mm.; height, 0.32 mm.

In moss. Collected by the writer at Mahomet, Ill. One specimen.

This species is near *P. americana* Ewing, but differs in the color and texture of the integument; in the shape of the pseudostigmatic organs which are more clavate, and in the size of the bristles of abdomen, etc.

Genus HOPLODERMA Michael.

Ungues monodactyle ; genital and anal covers separate.

1. With a large hood or collar projecting from the anterior margin of abdomen.
H. cucullatum sp. nov.
 Without hood or collar..... 2.

2. Hairs on abdomen spatulate..... *H. hamatum* sp. nov.
 Hairs on abdomen setiform..... *H. illinoensis* sp. nov.

Hoploderma cucullatum, new species. (Plate VI, Fig. 35.)

Body dark grayish green; legs yellowish brown; integument of abdomen pitted.

Cephalothorax with a median carina extending almost its entire length. Pseudostigma not projecting, but low and circular, situated at the extreme posterior part of cephalothorax.

Abdomen with a large hood at the anterior end which overhangs the posterior part of the cephalothorax; posterior end of abdomen broadly rounded. The abdomen bears dorsally on each side near the median plane a longitudinal row of six stout, short, spatulate bristles all inclined backwards. Genital covers longer than the

anal covers and when viewed from the side are seen not to project as far downwards as the latter.

Anterior pair of legs slightly longer than the cephalothorax. Claws stout. Length, 0.48 mm.; height, 0.32 mm.

In trash. Collected by C. R. Crosby at Columbia, Mo.

This species is easily recognized by the large hood projecting from the abdomen, the median carina on the cephalothorax and the pitted integument of the abdomen.

Hoploderma hamatum, new species. (Plate VI, Fig. 36.)

Pea green, with light yellowish brown tinge; legs yellowish brown, integument of both cephalothorax and abdomen pitted.

Cephalothorax one half as long as the abdomen and two thirds as high as long and possessing a median carina. Pseudostigma cup-shaped, situated at the extreme postero-ventral aspect of cephalothorax; pseudostigmatic organ long, simple, flagelliform, about four fifths as long as the cephalothorax, and much stouter towards the distal than towards the proximal end.

Abdomen long, rounded at posterior end, about one half as high as long. The abdomen has a submedian row on each side of ten spatulate bristles, all inclined backwards except the last two, which are ventral in position. There are several similar bristles situated outside the submedian rows. From the anterior margin of the abdomen there projects a small, chitinous band which may be homologous to the hood-like projection found in some species.

Legs of moderate size; unges stout.
Length, 0.48 mm.; height, 0.21 mm.

Under a log. Collected by the writer at Arcola, Ill.

Hoploderma illinoisensis, new species. (Plate VI, Fig. 37.)

Light yellowish brown; integument thin and brittle, pitted on the abdomen; integument of cephalothorax without pits.

Cephalothorax twice as long as high. Pseudostigma flat, circular, situated at the extreme postero-ventral aspect; pseudostigmatic organ long, filiform, sickle-shaped. Cephalothorax bearing a single pair of dorsal bristles, situated a little behind the middle, straight, pectinate and about as long as the cephalothorax is high.

Abdomen two thirds as high as long; anterior margin concave, inferior margin convex. The abdomen is rather finely pitted and bears on its dorsum six longitudinal rows of stout, straight, pectinate bristles; six bristles in the two inner rows, five in the next two outer rows and four in the two ventral rows. Genital covers rectangular, almost twice as long as broad with a row of about eight small hairs on the inner margin of each; anal covers slightly larger than the genital covers, somewhat rounded posteriorly and each bearing five simple hairs, one very large hair near the middle, about as long as the anal cover itself, a similar hair posterior to this one, an anterior hair about one third as long as the middle hair and two very small hairs on the inner margin near the posterior end.

Legs subequal in length but the anterior pair is stouter than the rest. Tarsal claw stout, about as long as the segment from which it extends.

Length, 0.45 mm.; height, 0.30 mm.

Under logs. Collected by the writer at Havana, Ill.

EXPLANATION OF PLATES.

PLATE II.

- Fig. 1. *Pelops laticuspidatus* sp. nov., lamellæ, translamella and lamellar hairs, $\times 456$.
 Fig. 2. *Pelops laticuspidatus* sp. nov., pseudostigmatic organ, $\times 456$.
 Fig. 3. *Pelops bifurcatus* sp. nov., seta from anterior margin of abdomen, $\times 456$.
 Fig. 4. *Oribata quadricuspidata* sp. nov., lamella and lamellar hair, $\times 456$.
 Fig. 5. *Oribata quadricuspidata* sp. nov., left pteromorpha, $\times 456$.
 Fig. 6. *Oribata nigra* sp. nov., pseudostigmatic organ, $\times 456$.
 Fig. 7. *Oribata macroptera* sp. nov., right pteromorphæ, $\times 171$.

PLATE III.

- Fig. 8. *Oribata rugosata* sp. nov., left pteromorphæ, $\times 456$.
 Fig. 9. *Oribata minuta* sp. nov., pseudostigmatic organ, $\times 456$.
 Fig. 10. *Oribata minuta* sp. nov., tarsus and tibia of leg I, $\times 456$.
 Fig. 11. *Oribata latineissa* sp. nov., lamellæ, translamella and lamellar hairs, $\times 456$.
 Fig. 12. *Oribata helvina* sp. nov., pseudostigma and pseudostigmatic organ, $\times 456$.
 Fig. 13. *Oribata helvina* sp. nov., right pteromorpha, $\times 456$.

PLATE IV.

- Fig. 14. *Oribata enodis* sp. nov., right anterior leg, $\times 456$.
 Fig. 15. *Oribatella magniseta* sp. nov., seta from abdomen, $\times 456$.
 Fig. 16. *Liacarus latus* sp. nov., pseudostigmatic organ, $\times 456$.
 Fig. 17. *Liacarus glaber* sp. nov., pseudostigmatic organ, $\times 456$.
 Fig. 18. *Liacarus magnilamellatus* sp. nov., pseudostigmatic organ, $\times 456$.
 Fig. 19. *Notaspis depilis* sp. nov., lamellæ, lamellar hairs, translamella and interlamellar hairs, $\times 456$.
 Fig. 20. *Notaspis brevisetosa* sp. nov., pseudostigma and pseudostigmatic organ, $\times 456$.
 Fig. 21. *Notaspis texana* sp. nov., interlamellar hair, $\times 456$.

PLATE V.

- Fig. 22. *Notaspis pallida* sp. nov., pseudostigma and pseudostigmatic organ, $\times 456$.
 Fig. 23. *Notaspis lamellata* sp. nov., pseudostigma and pseudostigmatic organ, $\times 456$.

- Fig. 24. *Notaspis minuta* sp. nov., pseudostigmatic organ, $\times 456$.
Fig. 25. *Damæus magnisetosus* sp. nov., leg I, $\times 171$.
Fig. 26. *Damæus magnisetosus* sp. nov., pseudostigmatic organ, $\times 456$.
Fig. 27. *Damæus micheli* sp. nov., pseudostigma and pseudostigmatic organ, $\times 456$.
Fig. 28. *Damæus rigidus* sp. nov., pseudostigma and pseudostigmatic organ, $\times 456$.
Fig. 29. *Damæus magnipilosus* sp. nov., seta from dorsum of abdomen, $\times 456$.
Fig. 30. *Hermannia subnigra* sp. nov., one of the lateral excretory tubes of the abdomen, $\times 456$.
Fig. 31. *Hermannia subnigra* sp. nov., pseudostigmatic organ, $\times 456$.

PLATE VI.

- Fig. 32. *Nothrus quadripinus* sp. nov., dorsum of abdomen, $\times 113$.
Fig. 33. *Ilypochthonius crosbyi* sp. nov., dorsal surface of abdomen, $\times 171$.
Fig. 34. *Phthiracarus fulvus* sp. nov., pseudostigma and pseudostigmatic organ, $\times 456$.
Fig. 35. *Hoploderma cucullatum* sp. nov., lateral view of abdomen, $\times 113$.
Fig. 36. *Hoploderma hamatum* sp. nov., piece of integument from abdomen, $\times 456$.
Fig. 37. *Hoploderma illinoensis* sp. nov., pseudostigma and pseudostigmatic organ, $\times 456$.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF MARCH 2, 1909.

Held at the American Museum of Natural History. Vice-President E. B. Southwick in the chair, with fourteen members present.

The librarian reported the receipt of the following exchanges:

Wiener Entomol. Zeitung, XXVIII, No. 1.

Mittheil. Naturh. Mus. in Hamburg, XXV.

Verhandl. d. k. k. Zool. Bot. Gesel. Wien, LVIII, No. 10.

Societas Entomologica, XXIII, Nos. 21-22.

Plans were discussed for compiling a list of the insects of New York State. It was the general opinion that it would be best to use the New Jersey List of Insects as a basis to which additions could easily be made. On motion of Dr. Love, the librarian was empowered to procure an interlinear copy of the New Jersey list to be used by the members in recording data.

The librarian announced that the exchange list was becoming too large and that the Society was receiving a great deal of non-entomological literature. He requested that the exchanges be more restricted. The matter was referred to the publication committee.

Mr. Pollard announced that the Council of the New York Academy of Sciences had granted Mr. Kearnott's request for a grant of \$400.00 to carry on the work of publishing a monograph of the Tortricidae of the World.

Mr. R. P. Dow spoke on the subject of "A Side Line Study of Larvæ of Several Orders" in which he detailed the work carried on by his brother and himself in detecting the presence of certain chemicals in the bodies of various larvæ. They endeavored to determine to what extent certain characteristic plant acids and juices could be detected mainly by taste. He proceeded to use this as a basis for a theory of classification in which he placed those insects highest which elaborated the more complex materials from their natural foods.

Mr. I. Matausch exhibited several excellent colored drawings of larvæ and adult stages of some Membracidæ, and spoke concerning his experiences, begun during July and August, 1907, in rearing members of this group. He had succeeded in rearing *Camphylenchia curvata*, collected on golden rod, from a very young stage. He remarked that the moulting of this insect takes place during the early morning hours. From observations made in the field he came to the conclusion that it was rather sedentary in habit, remaining on the same stem for long periods of time. He found that ants were especially fond of the exudations of *Vanduzia arcuata*, which occurs on the locust. He mentioned the food plants of many of the Membracidæ.

Mr. H. G. Barber exhibited a collection of palearctic Hemiptera recently purchased from Staudinger and Bang-Haas. In his remarks he dealt particularly with the following species of the collection which occur both in Europe and the United

States: *Pentatoma juniperina*, *Nezara viridula*, *Zicrona carulea*, *Corizus crassicornis*, *Nysius thymi*, *Cymus claviculus*, *Ischnorhynchus reseda*, *Emblethis griseus*.

Mr. W. T. Davis exhibited two specimens of the southern moth *Pygarctia abdominalis* Grote, from Lakehurst, N. J. One was taken on May 29, 1905, and recorded in the proceedings of the Society for March 20, 1906. The other was collected while sweeping low huckleberry bushes June 13, 1908.

Society adjourned.

MEETING OF MARCH, 16, 1909.

Held at the American Museum of Natural History, with President C. W. Leng in the chair and eleven members present.

Dr. C. L. Pollard invited the Society to participate in a joint meeting with the Brooklyn Entomological Society as guests of the Staten Island Association of Arts and Sciences on Saturday, May 8. The invitation was accepted and arrangements for an afternoon field trip were left with the Outing Committee.

Mr. Engelhardt proposed as an active member Dr. F. E. Lutz, of the American Museum of Natural History. On motion of Mr. Angell the by-laws were suspended and the secretary empowered to cast a single ballot for the election of Dr. Lutz.

Mr. Engelhardt exhibited an interesting series of the Bella moths—*Utetheisa bella* and *U. ornatrix*. The former was represented by a selected number of specimens from the eastern United States, showing extensive local variations, besides the varieties known as *hybrida* and *terminalis*. The variety *venusta* was represented by examples from Jamaica, W. I., and Cuba. *U. ornatrix* was shown from Texas, Guatemala and Porto Rico. While the specimens from Texas and Guatemala indicate only a slight tendency to variation, those from Porto Rico were remarkable in this respect. One series, beginning with a typical *U. ornatrix* was arranged to show a gradual line of variations ending in a good example of *U. bella*. Another series ended with a specimen indistinguishable from the European species *U. pulchella*. All of the specimens from Porto Rico were collected in a sandy region near San Juan during November and December, 1908. A discussion of climatic conditions as a factor in producing variations followed.

Mr. Wm. T. Davis exhibited a great number of oak-apple galls, *Amphibolips confluentus*, which he had found on the ground under three different oak trees on Staten Island, and which had been opened by squirrels for the larvæ within. The galls had been cut off of the trees by the squirrels and about one half of the outer shell and spongy matter in each instance had been torn away to secure the desired larvæ. He also exhibited acorns, hickory and other nuts opened to secure larvæ rather than the kernel itself.

Dr. R. C. Osburn exhibited a collection of over 500 Syrphidæ collected by two friends on the abandoned Hope Trail, British Columbia. One genus, *Pyritis*, described by W. D. Hunter a few years ago, was better represented in the lot than in all the other collections of the world combined.

Mr. John J. Davis, field entomologist, Illinois, spoke of his economic work in the vicinity of Chicago. He mentioned *Callopistria floridensis* as a pest in green houses. This has been reported hitherto only from Florida. Its larvæ were bright green while on the ferns, but when reared in a tin box were almost black. This was attributed to the degree of moisture present. In this connection Dr. Lutz described

his operations with the larvæ of *Isia isabella*, which were influenced by change of moisture. Many in wet environment were uniformly black, whereas in dry situations the many black bands failed to develop and the larvæ remained unicolorous.

Mr. G. W. J. Angell exhibited a series of the water beetle, *Hydrobius tessellatus*, taken in clear water at Westwood, N. J. These were all normal and uniform, while a single specimen taken in very dirty water was aberrant.

Society adjourned.

MEETING OF APRIL 6, 1909.

Held at the American Museum of Natural History. President C. W. Leng in the chair with seventeen members and one visitor present.

The librarian reported the receipt of the following publications since March 2:

Cold Spring Harbor Monographs, VII.

Entomologiske Meddeleser, Vol. III, No. 4.

Canadian Entomologist, Vol. XLJ, No. 3.

Zeitschr. f. wissenschaftl. Insektenbiologie, V, No. 2.

Wiener Entomol. Zeitung, XXVIII, No. 2.

Zoölogical Record, Insects, XLIV.

Charles Janet. Notes extraites des Comptes Rendus des Séances de l'Academie des Sciences, Nos. 16-20.

Charles Janet. Anatomie du corselet et Histolyse des Muscles Vibrateurs, après le vol nuptial, chez la reine de la fourmi.

The Insect World, XIII, Nos. 1, 2.

Deutsche Entomolog. Zeitschrift, 1909, No. 2.

The House-fly. Ent. Circ. 25, No. C., State Dept. Agric.

Mr. Leng spoke of the recent death of Mr. Wm. Edwards and read a brief notice which had appeared in the New York Sun.

Dr. R. C. Osburn spoke on the "Species of the *Syrphus arcuatus* Group." He said that this group of the Syrphidae was a very difficult one to study, but after examining material from several collections, including that of the American and National Museums and representing in distribution some twenty states and several provinces of Canada, he had found certain well-marked characters by which the species of *arcuatus* and the form *lapponicus* might be separated. These were differences in the venation, characteristic maculation on the frons and differences in coloration of the thoracic pile. The areas of enlarged eye facets in the males were also noted. The differences in coloration were found to be somewhat variable and not so constant a character as those noted above. Specimens illustrating the different forms were shown and the question of the names discussed.

Dr. Osburn also discussed the intergradations of *Scæva* with *Syrphus* and said that the species *pyrastri* L. had been placed by Osten-Sacken in the genus *Cataboma* in his paper on "Western Diptera," but had previously been assigned to the genus *Scæva*. This species had been separated from *Syrphus* on the characters of the frons, the pilosity of the eyes and the venation. Dr. Osburn pointed out that various species in the genus *Syrphus* showed differences as marked as this species in these respects, and he did not believe that such characters could be regarded as being of specific rank, although they might be useful for grouping certain species within the genus *Syrphus*.

Mr. Matausch exhibited some original water color drawings of Membracidae from Rincon Mts., Arizona, collected by Mr. G. Beyer.

Mr. Schaefer exhibited and pointed out the salient characters of some twenty new species of Coleoptera, the descriptions of which will form a small paper to be published in the Bulletin of the Brooklyn Museum. He exhibited a specimen of *Dytiscus verticalis* with elytra expanded and called attention to the wing-like appendage at the base of each elytron. He also showed specimens of *Pandeleletejus cavirostris, robustus, submetallicus*, and *Cimbocera conspersa* in which the deciduous mandibular appendages were still present. These appendages are present in the larval stage but are lost in the early life of the imago, leaving a scar at the place where they have been attached. The presence of this scar and the form of the mandibles, which are pincer-like and formed rather for crushing than cutting, is the important character separating the Otiorhynchidae from the rest of the Rhynchophora. He showed also a small branch of *Acacia cornigera* and called attention to the small appendages at the tip of the leaflets, which are called "Belt's bodies." These small appendages contain much albumen and are eaten by ants which inhabit the large, hollow thorns of several species of *Acacia* in tropical America. The ants also feed on the sugary fluid, secreted from extrafloral nectaries, near the base of the petioles. The ants which thus receive shelter and food from the tree are said to protect it by keeping away the leaf-cutting ants.

Mr. Cook told of his experiences in searching for winter eggs of Lycaenidae and said that by carefully noting where the female oviposited in the fall, he sometimes succeeded in finding two or three eggs in a day. He had observed *Lycaena scudderia* ovipositing on lupine. The female would work its way nervously down the stem, inserting the tip of the abdomen in the axles of the petioles as if ovipositing but actually would not lay an egg until it had reached the second or third node from the base of the stem, and in fact, would sometimes place the egg on grass or other vegetation close by.

The ovipositing of *Chrysophanus thoë* had also been observed, and in company with Mr. Davis, Mr. Cook had just succeeded in obtaining eggs of *Epidemias epixanthe* at Jamesburg, N. J. This species oviposits on the cranberry. In doing so the insect flutters down nervously in an open spot and places the egg low down on the plant, but never on the tips of the vine.

Mr. Davis exhibited a specimen, which had been captured on Staten Island, of the recently described *Plagodis schuytkillensis* Grossbeck.

Dr. Zabriskie said that he had recently been in California and among other interesting things had observed a number of woodpeckers storing acorns in the bark of the oak trees in several localities.

In the discussion Mr. Davis said it was no doubt a great help to the woodpeckers to place the acorns in the holes they made for them for the reason that they could then hold them as in a vise, and open them more easily.

Society adjourned.

MEETING OF APRIL 20, 1909.

Held at the American Museum of Natural History at 8.15 P. M. President C. W. Leng in the chair with twenty-one members present.

The librarian reported the receipt of the following exchanges:

Georgia State Board of Entomology. Circulars, Nos. 6, 7, 8. Bulletins, Nos. 24, 26, 27, 28.

Bulletino della Soc. Entomol. Italiana, XL, Nos. 1, 2.

Canad. Entom., XLI, No. 4.

Zeitschr. f. Wissenschaft. Insektenbiologie, V, No. 3.

Verhandl. d. k. k. Zoolog. Bot. Gesel. Wien, LIX, Nos. 1, 2.

Mr. Dow, of the Field Committee, announced the outing at next Saturday's meeting on Staten Island, at which Mr. Davis will act as a guide.

Dr. Love proposed Dr. Henry E. Crampton, of the American Museum, as an active member of the Society. On motion the by-laws were suspended and the secretary authorized to cast a single ballot for the election of Dr. Crampton.

Dr. Southwick invited the members of the Society to attend an outing of the Torrey Botanical Society to be held at South Amboy, Saturday, April 24.

Dr. Lutz spoke concerning "Experimental Work with *Drosophila ampelophila*." He remarked that this fly has proved to be excellent material for experimental investigation of evolution. He spoke of the method of rearing the fly on over-ripe fruit. It thrives well under laboratory conditions, the life-cycle is short, the number of offspring large and it can be kept breeding throughout the year. Although the present work was started less than three years ago, more than fifty pedigree generations had been obtained.

Most of the time had been spent in studying the inheritance of abnormal venation. About one third of one per cent. of the flies in nature have an extra vein or part of a vein in the antero-distal portion of either one or both wings. This portion of a vein is frequently no more than a mere speck, but by selective breeding one can get a race of flies in which all of the individuals possess supernumerary veins, and in some individuals the additional vein material almost or quite equals in amount the normal. Also, one occasionally finds wild flies in which the fifth longitudinal vein does not quite reach the margin of the wing. By using these as the starting point of selection, it is possible to get a strain in which it is a common occurrence for most of the veins to stop short at that margin. Although the flies of the pedigree strain have not been allowed to use their wings for a relatively large number of generations, there has been no degeneration due to disuse. He remarked that, curiously enough, in interbreeding, the sexes selected normal individuals in mating.

In reply to a question from Mr. Leng, Dr. Lutz explained the Mendelian theory.

Mr. Matausch exhibited a number of hand-colored, original drawings of some interesting local species of Membracidae collected by Mr. Davis.

Mr. Leng exhibited a collection of *Brachyacantha*. He sketched the history of the systematic work that has been published on the genus and described the characters by which it is separated from other Coccinellidae. He referred particularly to the various modifications that are found in the ventral segments of the males, and stated that a similarity in this respect apparently accompanies a similarity in pattern of elytral maculation. He closed by describing especially the difference between the species that have been treated by Gorham as varieties of *dentipes* and expressed the opinion that some of these at least should be regarded as valid species.

Mr. Dickerson exhibited two specimens of *Carabus nemoralis*, which he had taken under stones in his back yard in Newark in April, remarking that this was further evidence that this European species was well established in the eastern United States.

Mr. Angell remarked on the introduction and spread of this species.

Mr. Pollard stated that he had collected and examined 47 cocoons of *Samia cecropia* collected near Watchogue, Staten Island, and 50 collected in the outskirts of Brooklyn, and found that of the Watchogue pupæ only one was normal, three were parasitized by *Ophion*, ten parasitized by Braconids, ten parasitized by other insects, nineteen destroyed by fungus, six destroyed by mice, birds, etc.; in the Brooklyn pupæ none was normal, five were parasitized by *Ophion*, eight parasitized by Braconids, seven parasitized by other insects, eleven destroyed by fungus and nineteen eaten by mice, birds, etc.

Society adjourned.

MEETING OF MAY 4, 1909.

Held at the American Museum at 8.15 P. M. with President C. W. Leng in the chair and sixteen members and one visitor present.

The minutes of the preceding meeting were read and approved.

Mr. Pollard announced the final program of the meeting to be held at New Brighton, Staten Island, on Saturday, May 8, under the auspices of the Staten Island Society of Arts and Sciences.

Dr. Lutz announced that at a conference with the librarian, Dr. Tower, he had been informed that all members of the Society would be permitted to borrow from the library any monographs and papers they desired.

Mr. Southwick invited the members to attend a three days' outing, May 28-30, of the Torrey Botanical Club at New Baltimore, Green Co., N. Y.

Mr. C. H. Roberts exhibited all of the known and several new species of the genus *Graphoderes* belonging to the family Dytiscidæ, and gave some interesting notes concerning the results of his study of this genus.

Among other things he said that this genus contained few species and all were of good size. He spoke of the good distinguishing characters in the differences found in the tarsal disks and cupules in the males. The check list of North American Coleoptera, he was certain, was erroneous in respect to this genus. Horn had suppressed *fasciaticollis* Harris, making it a synonym of the European species *cinereus*. After examining two or three hundred specimens of this species, he had come to agree with Dr. Sharp that our *fasciaticollis* is a distinct species. The structural differences were compared by Mr. Roberts. Although *occidentalis* from Winnipeg closely resembles *austriacus*, distinct differences in the tarsal claws of the male would readily distinguish them. He had received from Mr. Leng a number of specimens of a large species of *Graphoderes* from Nova Scotia and New Foundland, which he had at first thought might be Dr. Sharp's *elatus*, but had found differences in the tarsal cupules which made it probable that this was a new species, larger than *elatus*. The real *elatus* he had not seen. He also spoke of the progress he had been making in the study of *Haliphus*. He had been able to separate several new species, differentiated by good characters which had formerly been lumped with other forms. He spoke of the characters used in distinguishing members of this genus.

In reply to Mr. Leng's question as to whether there were any Dytiscidæ common to Europe and the United States, Mr. Roberts replied that the more thoroughly he pursued his studies the more convinced was he that none was common to both countries, with the possible exception of a few strictly boreal species which might be circumpolar. He explained his method of mounting Dytiscidæ for study.

Mr. George Franck exhibited a collection of nearly all the species of *Cenonympha* occurring in the United States, and read some remarks on the genus which are to be printed in the body of the Journal.

Dr. Lutz exhibited, on behalf of Mr. Matausch, some enlarged water color drawings showing the extreme and medium forms of *Microcentrus caryaæ*.

Mr. Wm. T. Davis exhibited an acorn of the chestnut oak, the inside of which had become a hollow chamber and enclosed eight gall-like cells, each containing a larva. The specimen was collected at Runyon, N. J., May 2.

Mr. Schaeffer exhibited the nest of the Mexican honey-making wasp, *Nectarina lecheguana*, which he had found in Brownsville, Texas and spoke of the sweet, intoxicating character of the honey.

Mr. Angell exhibited some specimens of *Carabus nemoralis* collected in the Bronx and spoke of the variation in the color.

Society adjourned.

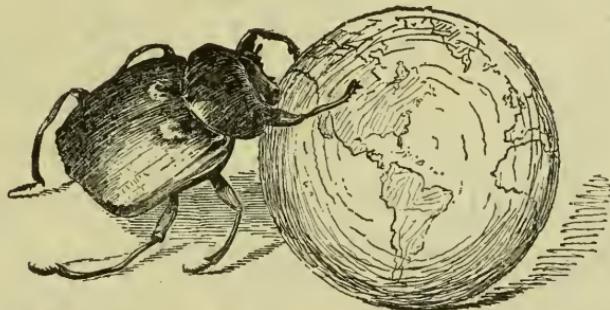
H. G. BARBER,
Secretary.

VOL. XVII.

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NEW YORK
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Devoted to Entomology in General.



DECEMBER, 1909.

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W. M. WHEELER.

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VOL. XVII.

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No. 4.

NEW TROPICAL PSEUDOSCORPIONS.

By NATHAN BANKS,

EAST FALLS CHURCH, VA.

In going through some material from Mexico and South America I find a few new species of these Arachnida, which are herewith described. Most of the specimens were collected by Mr. Baker or Dr. Moenkhaus, a few by Dr. Eisen. Of particular interest is the new *Garypus* which is very different from the one known South American species, which was also in the collection.

i. Garypus viridans, new species.

Cephalothorax, palpi and legs pale greenish, fingers more reddish, abdomen darker, probably also greenish when alive. Cephalothorax subtriangular, but longer than broad behind, front deeply emarginate in middle, the anterior of the two eyes each side is more distinct than the posterior; a groove, with ends curving forward, toward the posterior end, surface finely granulate, a few very short clavate hairs in front; stylet of mandibles long, tip outcurved, two little processes on the inner side toward the tip. Palpi long, trochanter long, slightly swollen on lower side behind, femur longer than cephalothorax, gradually enlarging from base to near tip; tibia fully two thirds length of femur, enlarging from base to tip, but little broader than femur, inner side barely convex; claws very long; hand not much shorter than the tibia, more than twice as long as broad, nearly twice as broad as tibia, sides subparallel, fingers longer than hand, slender, curved, with many simple hairs, other joints with few and extremely short ones, barely visible; surface of claw not granulate. Abdomen about one and a half times as long as broad, some of the segments divided, but not separated, their surface minutely granulate,

no hairs visible; legs slender, with very short hairs, except on the apical joints.

Length 3.2 mm.

From Santa Marta, Colombia (Baker).

2. Chelifer approximatus, new species.

Cephalothorax and palpi dark yellow-brown, legs paler, dorsal scutæ brown. Cephalothorax with numerous small conical tubercles, elsewhere finely granulate. Dorsal scutæ long and narrow, approximate on inner edges, granulate, and with six or eight very short clavate hairs behind, and a few on the disc. Palpi very long and slender; the trochanter with short stiff hairs, a scabrous swelling behind with two tips; femur one and a half times as long as the cephalothorax, gradually enlarging from the base to tip, densely granulate, and with many short, clavate hairs; tibia nearly as long as the femur, slightly broader near tip, inner side straight, outer side concave at base, then convex toward the tip, the short hairs nearly simple; claw longer than femur, very slender, the hand rather broadest near base, but the sides nearly parallel, about one and a half times as broad as tibia, nearly as long as the cephalothorax, with a few simple hairs; fingers slender, curved, scarcely as long as hand, with few long hairs, and many shorter, simple ones.

Length ♂ 2.5 mm.; ♀ 4 mm.

From Pescadero, and El Taste, Lower California.

3. Atemnus gracilis, new species.

Cephalothorax pale yellowish brown, palpi reddish brown, abdomen and legs pale yellowish. Cephalothorax one and two thirds times as long as broad, broadest behind, rounded in front, an eye-spot each side, behind near tip is a transverse line, surface smooth, a few simple hairs. Basal part of mandibles rather larger, stylet forked nearly to the base. Palpi rather large; trochanter with a small swelling behind toward the tip; femur only a little longer than width of the cephalothorax, distinctly pedicellate, broadest near base, inner side toward tip concave; tibia as long as femur, convex on both sides, once and a half as broad as femur; claw very large, rather longer than the cephalothorax, hand very broad at base, more than once and a half as broad as tibia; fingers about as long as hand, large and curved; all joints with rather long simple hairs; abdomen fully three times as long as broad, narrowed at base, tip with several long simple hairs.

Length 2 mm.

From Sonora, Mexico.

4. Chelanops obesus, new species.

Cephalothorax and palpi dark red-brown, the latter the darker; dorsal scutæ dark brown; legs pale reddish brown, paler at tips. Cephalothorax nearly smooth, but very finely granulate, with a few scattered very short clavate hairs. Palpi very heavy; the trochanter globose above behind; the femur about as long as the width of the cephalothorax, sides subparallel,

rather concave near inner tip; tibia about as long as femur, rather long pedicellate, much swollen on inner side and then almost concave, as broad as the femur; claw much longer than cephalothorax and mandibles together, the hand nearly as long as tibia, extremely broad, about two and a half times as broad as tibia, truncate at base, tapering to the fingers, which are rather slender, curved and nearly as long as the hand; clavate hairs on trochanter, femur and inner surfaces of tibia and hand, also clavate hairs on upper surface of legs. Stylet of mandibles short and simple. Dorsal scutæ very narrow, with about eight hairs behind.

Length 4 mm.

From Tucson, Arizona, and Lower California, Mexico.

5. *Chelanops calidus*, new species.

Cephalothorax yellow-brown, palpi uniform pale yellowish brown, dorsal scutæ brownish. Cephalothorax finely granulate, with few clavate hairs; stylet of mandible slender and simple. Palpi rather short; trochanter gibbose above and also behind; femur hardly as long as width of cephalothorax, sides nearly parallel, rather broadest near base; tibia nearly as long as femur, evenly convex on the inner side, plainly broader than the femur; claw longer than cephalothorax plus mandibles, hand rather heavy, about twice as broad as the tibia, broadest at base, tapering to the fingers, which are as long as hand, and rather large. A few nearly clavate hairs on the trochanter, other hairs simple, long and variable in length. Dorsal scutæ short, with about five simple bristles on posterior edge; long bristles on the last segment.

Length, ♀ 2.5 mm.; ♂ 2 mm.

From Sonora, and Lower California, Mexico.

6. *Chelanops confraternus*, new species.

Closely related to *Chelanops nitidimanus* Ell.; the proportions of parts similar to that species. The femur of palpus fully two and one half times as long as broad; the fingers as long as hand; the hand as described for *C. nitidimanus*, the hairs barely clavate. The three hairs on the posterior edge of each dorsal scutum are strongly clavate, and very short; the cephalothorax is granulate behind, but nearly smooth in front. The cephalothorax and palpi dark red-brown, the fingers paler, the cephalothorax has a long white spot each side behind as in *C. nitidimanus*, and the first abdominal segment also has the same spots, while the fourth to ninth segments inclusive have at their outer tips a distinct white spot, making five white spots along each side at the middle of the abdomen.

Length 2 mm.

From Poco Grande, Brazil.

7. *Chelanops garcianus*, new species.

Color pale yellowish brown. The cephalothorax with groove behind the middle, surface finely and evenly granulate; stylet of mandibles simple, not very long, point outcurved; palpi of moderate length, the trochanter with two

humps behind, femur as long as width of the cephalothorax, of nearly even width throughout, the inner margin slightly concave before tip; tibia as long as femur and as wide in the middle, strongly convex on inner side, evenly and slightly convex on outer side, claw longer than cephalothorax and mandibles, hand one and one fourth times broader than tibia, not much swollen on either side, more so on inner side; all the joints bear short distinctly clavate hairs, those on the outer sides of the tibia and hand are simple, and those on finger are long and simple. There are also clavate hairs on the cephalothorax and eight or nine very short clavate hairs on the posterior edge of each dorsal scutum.

Length 2 mm.

Havana, Cuba.

8. *Olpium modestum*, new species.

Cephalothorax and palpi pale yellowish brown, darkest on fingers and front of cephalothorax, rest of body and legs pale yellowish. Cephalothorax one and a half times longer than broad; palpi of moderate length; femur nearly as long as cephalothorax, front margin slightly convex; tibia a little shorter than femur, plainly broader; claw as long as cephalothorax plus mandibles, hand twice as broad as femur, fingers about as long as hand; abdomen two and one half times as long as broad, broadest in middle; body, palpi and legs with fine hairs.

Length 2 mm.

From Pernambuco, Brazil.

Near to *O. ramicola* Balzan or *O. elegans* Balzan, but the tibia is plainly heavier than in those species; the hand is not as broad as in *O. cordimanum*, while femur and hand are both more slender than in *O. crassichelatum*.

THREE CUBAN COLEOPTERA NEW TO THE FAUNA OF THE UNITED STATES.

By CHAS. SCHAEFFER,

BROOKLYN, N. Y.

Two of the interesting additions to the coleopterous fauna of the United States, of which short descriptions are given below, were collected in Chokoloskee, southwestern Florida, and kindly given me by Mr. George Franck; the third; which I owe to the liberality of Mr. G. W. J. Angell, was collected at Enterprise, Florida, by C. W. Brownell.

1. *Calosoma splendidum* Mann., Dej. Spec. Gen., Vol. V, suppl., p. 558.

Green, shining, without coppery or golden margin on thorax and elytra; tibiae, tarsi, mouthparts and antennae black; elytra crenate-striate and with three rows of small punctures.

Length 20-26 mm.

Habitat.—Enterprise, Florida; S. Domingo.

To be placed with *scrutator*, *aurocinctum* and *wilcoxi*, from which *splendidum* differs by the uniform green color of head, thorax and femora.

2. *Alaus (Calais) patricius* Cand. Monog. Elat., Vol. I, p. 242, pl. IV, fig. 8.

Brown, densely covered on the upper and under side with grayish-white, squamiform hairs, but intermixed with brown on the upper side; the latter color forms a large spot of irregular outline at sides near middle of each elytron and on the prothorax two distinct, small, eye-like spots, which are equidistant from each other and the side margin. The thorax is truncately lobed at middle of apical margin; the hind angles are relatively strongly divergent and carinate. The striae of elytra are feebly punctate; the apices of elytra deeply emarginate. The antennae of the male reach to the hind angles of thorax and are pectinate, those of the female are shorter and serrate.

Length 30-40 mm.

Habitat.—Southwest Florida; Cuba.

The figure given by Candèze lacks the eye spots, though he distinctly mentions them in his short Latin diagnosis and the following fuller French description.

Otto Schwarz in "Genera Insectorum" includes this species erroneously in his section "Prothorax ohne Tomentmakeln," which, though smaller than in *myops*, are nevertheless very apparent and distinct.

From our North American species of *Alaus* this new addition will be easily known by the deeply emarginate apices of elytra, the two very small eye-like spots of the prothorax, which are equidistant from each other and from the lateral margins, the truncately lobed apical margin of prothorax, the pectinate antennae of the male and the denser vestiture of upper and under side.

3. *Strongylaspis scobinatus* Thoms. Class. Ceramb., p. 313.

Pale brown, dull. Head, prothorax, scutellum and elytra covered with fine granules. Third joint of antennae elongate, longer than fourth. Eyes strongly granulate. Prothorax crenulate at sides and posteriorly with a strong spine; basal margin, on each side near the spine, arcuately emarginate; disk slightly uneven. Scutellum rather strongly convex. Elytra as wide as the thorax at base; humeri subspinose; sides nearly parallel; apices rounded

at sides, spinous at suture. Prosternum arcuately convex. Femora and anterior tibiæ on the inner side dentate.

Length 23-31 mm.

Habitat.—Southwest Florida; Cuba; Mexico; Nicaragua.

This species has to be placed near *Ergates*.



COCCIDÆ OF JAPAN (III). FIRST SUPPLEMENTAL LIST OF JAPANESE COCCIDÆ, OR SCALE INSECTS, WITH DESCRIPTION OF EIGHT NEW SPECIES.

BY S. I. KUWANA, A.M.,

IMPERIAL AGRICULTURAL EXPERIMENT STATION,

NISHIGAHARA, TOKYO, JAPAN.

(WITH PLATES VII-IX.)

In the present paper are listed 18 species of Coccidæ, or scale insects, from Japan, which were collected by the writer and others, and studied by the writer since his last paper on "Coccidæ of Japan" (*Bull. of Imp. Agr. Exp. Sta.*, Vol. I, No. 2). Eight of these species are new to science, two species are new to Japan, while the remaining species have been previously recorded from Japan by various writers, although this is the first time they were actually found by the writer in his native country.

The generic names employed are those that have been in general use to within the last few years. A number of very radical changes in the nomenclature have been put forward, but I prefer to retain for the present the well-known names with which we have become familiarized.

The writer's thanks are due to Prof. T. D. A. Cockerell, for kindly reviewing his manuscript and specimens.

1. *Icerya purchasi* Mask.

I received specimens of this insect from Mr. I. Nitoba, Formosa Agricultural Experiment Station, and Mr. M. Hino, Formosa Horticultural Experiment Station, in the fall of 1908. It was probably introduced from Australia, recently, and is very destructive at Taihoku City. The host plants known in Formosa are as follows:

<i>Acacia richii</i> A. Gr.	<i>Citrus japonica</i> Thunb.
<i>Pithecolobium dulce</i> Benth.	<i>C. medica</i> var. <i>chirocarpus</i> Lour.
<i>Albizia lebbek</i> Benth.	<i>Murraya exotica</i> L.
<i>A. moluccana</i> Boio.	<i>Ægle spioria</i> Dc.
<i>Lespedeza cyrtobotrya</i> Mag.	<i>Pyrus communis</i> L.
<i>Pterocarpus indicus</i> Willd.	<i>Musa sapientum</i> L.
<i>Lespedeza juncea</i> Pers.	<i>Salix babylonica</i> L.
<i>L. sieboldii</i> Moq.	<i>S. warburgii</i> Seem.
<i>Cassia</i> sp.	<i>Artemisia vulgaris</i> L.
<i>Grevillea robusta</i> Cunning.	<i>A. capillaris</i> Th.
<i>Erythrina corallicordatum</i> L.	<i>Bidens pilosa</i> Linn.
<i>Poinciana regia</i> Boj.	<i>Carica papaya</i> L.
<i>Indigofera tinctoria</i> L.	<i>Cinnamomum camphora</i> Nees.
<i>Citrus medica</i> L.	<i>Trema orientalis</i> Bl.
<i>C. decumana</i> L.	<i>Viburnum erosum</i> Thunb.
<i>C. bigaradia</i> Duham	<i>Durantia plurinervia</i> Jacq.
<i>C. nobilis</i> Lous.	<i>Tectona grandis</i> L.
<i>Callicarpa formosana</i> Rolfe.	<i>Ficus pumila</i> L.
<i>Pyrus sinensis</i> Lind.	<i>Perilla neukinensis</i> Dene.
<i>Rosa centifolia</i> L.	<i>Slervia coccinea</i> .
<i>Bischoffia javanica</i> Blum.	<i>Nandina domestica</i> Thunb.
<i>Macaranga tanarius</i> Muell.	<i>Lawsonia inermis</i> L.
<i>Ricinus communis</i> L.	<i>Ecdysanthera utilis</i> Hayet Kaw.
<i>Codium variegatum</i> Blum.	<i>Nerium odoratum</i> Soland.
<i>Spium sebiferum</i> Koxb.	<i>Thea sinensis</i> L.
<i>Mallotus japonicus</i> Fr. et S.	<i>Antigonon leptopus</i> .
<i>Casuarina quadrivalvis</i> La Bill.	<i>Polygonum multiflorum</i> Ph.
<i>C. cunninghamiana</i> Maq.	<i>Callistemon lanceolatus</i> Dc.
<i>C. equisetifolia</i> Forst.	<i>Eucalyptus robusta</i> Smith.
<i>C. suberosa</i> Willd.	<i>Celtis sinensis</i> Pers.
<i>C. torulosa</i> Ait.	<i>Psychotria elliptica</i> Ker.
<i>C. distyla</i> Vent.	<i>Magnolia longifolia</i> .
<i>Pamaris juniperina</i> Bge.	<i>Hibiscus mutabilis</i> L.
<i>Ficus retusa</i> L.	<i>Calophyllum luophyllum</i> .
<i>F. carica</i> L.	

2. *Asterolecanium bambusæ* Bdv.

Liu-Kiu Islands, on bamboo, collected by Mr. T. Kuroiwa, 1897.
This is the first record from Japan.

3. Asterolecanium pasaniæ, new species (Kuw. & Ckll.). (Pl. VII, Figs. 1-6.)

Ovisac of Female.—Glassy and semitransparent; elongate in form, slightly narrowed toward posterior end, convex; median longitudinal ridge distinct. General color greenish yellow, with well-developed pinkish fringes; the anterior half is usually more or less yellowish brown. Ventral surface flat. Length about 1.5 mm.

Adult Female.—Boiled in KOH the body changes to reddish purple; subcircular; margin with one row of figure-of-8 glands, and within them a single series of small simple glands. Antennæ small, consisting of a single conical segment, with a strong spine. Mouth parts large, well formed. Posterior end with two lobes, each with a single long spine.

Habitat.—Hachijo Jima, on *Pasania cuspidata* Oerst. Collected by the writer, September, 1905. This species has not as yet been found on the mainland.

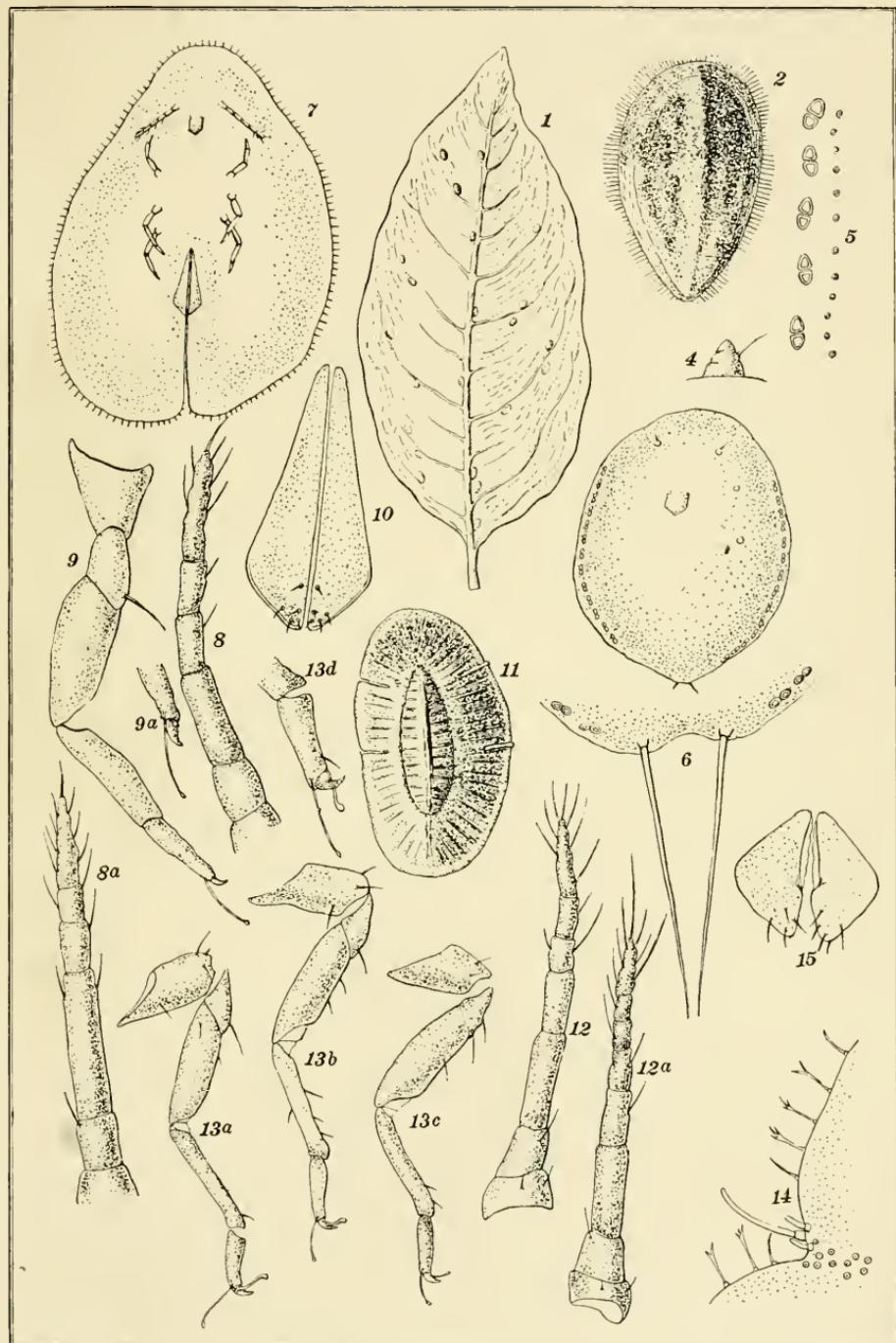
Notc.—"Your coccid from Hachijo Jima is not a *Leccaniodiaspis*, but is a species of *Asterolecanium*, of the subgenus *Bambusaspis* Ckll. 1902. The known species of *Bambusaspis* are: *A. miliaris* Bdv., *A. bambusæ* Bdv., *A. delicatum* Green, *A. solenophoroides* Green, *A. palmæ* Ckll. and *A. urichi* Ckll. Yours is perhaps nearest to *A. delicatum*, but I believe it is new."—Ckll., Oct. 27, 1905.

"I have now compared your species with *A. delicatum* Green. I find that the latter is quite different. *A. delicatum* has a much longer fringe which is entirely light yellow (not reddish)."—Ckll., Nov. 4, 1905.

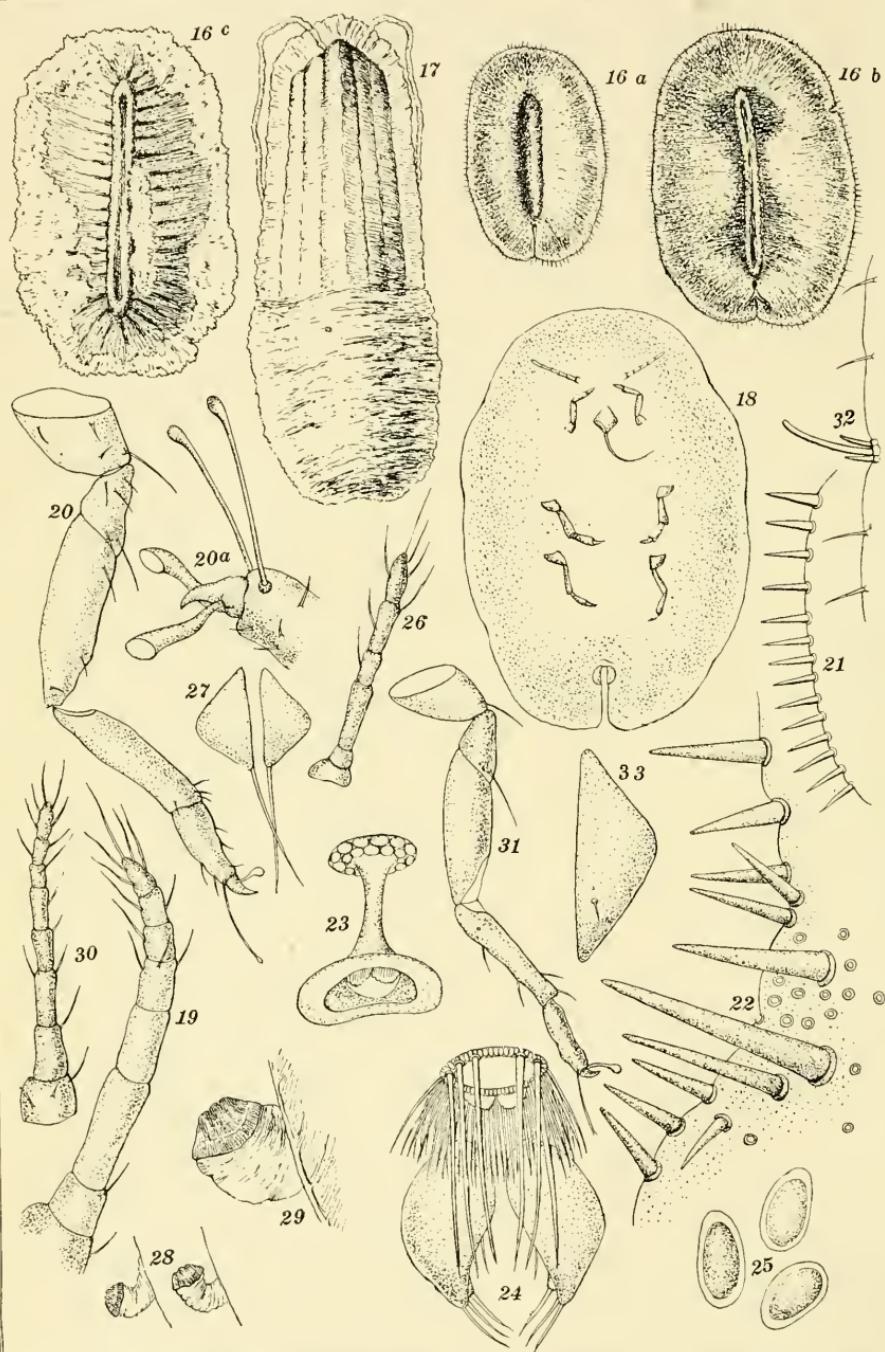
4. Lichtensia japonica, new species. (Pl. VIII, Figs. 16-27.)

Ovisac of Female.—Very elongate ovate, white, covering whole body; slightly narrowed in front, convex; front half with many longitudinal carinæ. Two long cottony filaments project anteriorly, near frontal margin. Length 7-9 mm.

Adult Female.—Immediately prior to the formation of the ovisac, pale yellowish brown, with dark brown irregular marking on the dorsum. A white cottony longitudinal bar on the dorsum. Broadly oval in form, convex; stigmatic clefts not very deep. Antennæ 8-jointed, the third the longest, the first joint always widest; formula 3, 4, 2, 8, 5, 6, 7, 1, or 3, 4, 8, 2, 5, 6, 7, 1; last few joints with many long hairs; about 1 mm. long. Legs very large and rather stout; trochanter very large, with one long and several small spines; tibia much longer than tarsus; tarsal digitules long rather stout hairs; those of claw short and club-shaped. Claw short, stout and curved. Marginal spines very strongly formed, tips very sharply pointed. Stigmatic area with three (sometimes four) spines and a group of spinnerets; one of these spines is very large, others much smaller and not much longer than the marginal spines. Dorsum with two longitudinal rows of short conical spines. Anal cleft not



Japanese Coccidae.



Japanese Coccidae.

very deep. Anal plates large, outer edge rounded; three to four spines at the apex and one at middle of the inner edge. Length 3-4 mm., width 2-3 mm.

Egg.—Oval in form, pale yellow in color. Length about .25 mm.

First Larval Stage.—Elongate in form. Antennæ and legs well formed; mouth parts very large. Antenna 6-jointed; third joint the longest, second joint the shortest; formula 3, 6, 5, 4, 1, 2. Tibia and tarsus about equal in length. Anal plates prominent, with one long spiny hair at their apices. Length about .3 mm.

Habitat.—Tokyo and Kanagawa, on *Thea japonica* L.; collected by the writer, May, 1905.

5. *Takahashia citricola*, new species. (Pl. VIII, Figs. 28-33.)

Adult Female.—Semicircular in form; orange in color, with dark marking on the dorsum. At the completion of the ovisac the body is free from the plant, resting on top of the sac as shown in the figure. Antennæ and legs well formed, but rather small and stout. Antenna 8-jointed, third joint the longest, first joint broadest; formula 3, 2, (4, 8), 1, 5, (6, 7); last few joints with many long hairs. Legs subequal; tibia longer than tarsus, almost twice as long as the latter; digitules of tibia long hairs, those of claw stout and short; claw stout and curved. Marginal spines simple. Stigmatic spines three, the median one much longer than the others. Anal ring with eight strong spine-like hairs. Anal plates large, outer angle rounded, a prominent spine near the apex. Length about 4 mm.

Habitat.—Kumamoto, Hukuoka and Wakayama, on *Citrus*. Collected by the writer, July, 1907.

This species is allied to *Takahashia japonica* Ckll., but differs in having a short ovisac and a small round body.

6. *Pulvinaria camellicola*, Sig.

Tokyo, on *Eurya ochnaceæ* Sgysz. It is common on this plant about Tokyo City, and very destructive, but I do not find it on *Thea (Camellia) japonica* L. It differs somewhat from the European form, especially in the shape of the ovisac.

7. *Ceroplates rubens* Mask.

Nagasaki, on *Diospyros kaki* L. f. and orange, collected by the writer in the summer of 1907. Although long since recorded from Japan, this is the first time this species has been found by the writer. It is probably introduced from some tropical country.

8. *Lecanium (Saissetia) nigrum* Nietn.

Liu-Kiu Island; collected by Mr. T. Taira from an unknown host, Liu-Kiu Agricultural Experiment Station, 1907. This is the first time this species has been found in Japan.

9. *Lecanium (Coccus) fukayai*, new species. (Pl. VII, Figs. 7-10.)

Adult Female.—Irregularly deltoid, very flat. Color pale green. Anal cleft more than one third the total length of the insect. Marginal spines simple; stigmatic spines not very long, simple. Antennæ usually 6- but rarely 7-jointed; third joint the longest; formula 3, 6, 2, 4, 5, 1. Legs well formed, but rather small; three pairs alike; tibia longer than tarsus; tarsal digitules fine hairs; those of claw unknown; claw large, curved. Anal plates bluntly pointed, base more than twice as long as outer edge; at the apex with four or five spiny hairs. Length about 2 mm.

Ibaraki, on vine, collected by C. Fukaya, March, 1907. Named after the collector, who is now working on Japanese Coccidæ under the direction of the writer.

The present species is allied to *Lecanium mangiferae* Green, but differs markedly as follows: The antenna of *L. mangiferae* is 8-jointed; the second and eighth equal and longest, while that of the new species is usually 6- and rarely 7-jointed, and the third is the longest. The extremities of the marginal spines of *L. mangiferae* are divided into many forks, while those of the new species are simple and pointed.

10. *Lecanium (Coccus) ochnaceæ*, new species. (Pl. VII, Figs. 11-15.)

Adult Female.—Pale yellowish green; oval in outline, widest at thorax, very thin, broadly flattened, with slight median longitudinal ridge; stigmatic clefts shallow. Antennæ usually 8-, but rarely 7-jointed; third joint the longest; about .3 mm. long; formula 3, 8, 4, 2, 5, 6, 7, 1. Legs well developed and large; three pairs alike; tibia much longer than tarsus; claw large, curved; digitules ordinary. A row of several strong, spiny hairs on the ventral aspect, between the antennæ. Marginal hairs very prominent, divided at extremity; stigmatic spines three, the median one very long and slightly curved, the other two less than half as long. Anal plates large, outer angle evenly rounded; outer edge longer than base; several prominent spines at the apex. Length about 2.5 mm.

Tokyo, on *Eurya ochnacca* Szysz., collected by the writer, April, 1907.

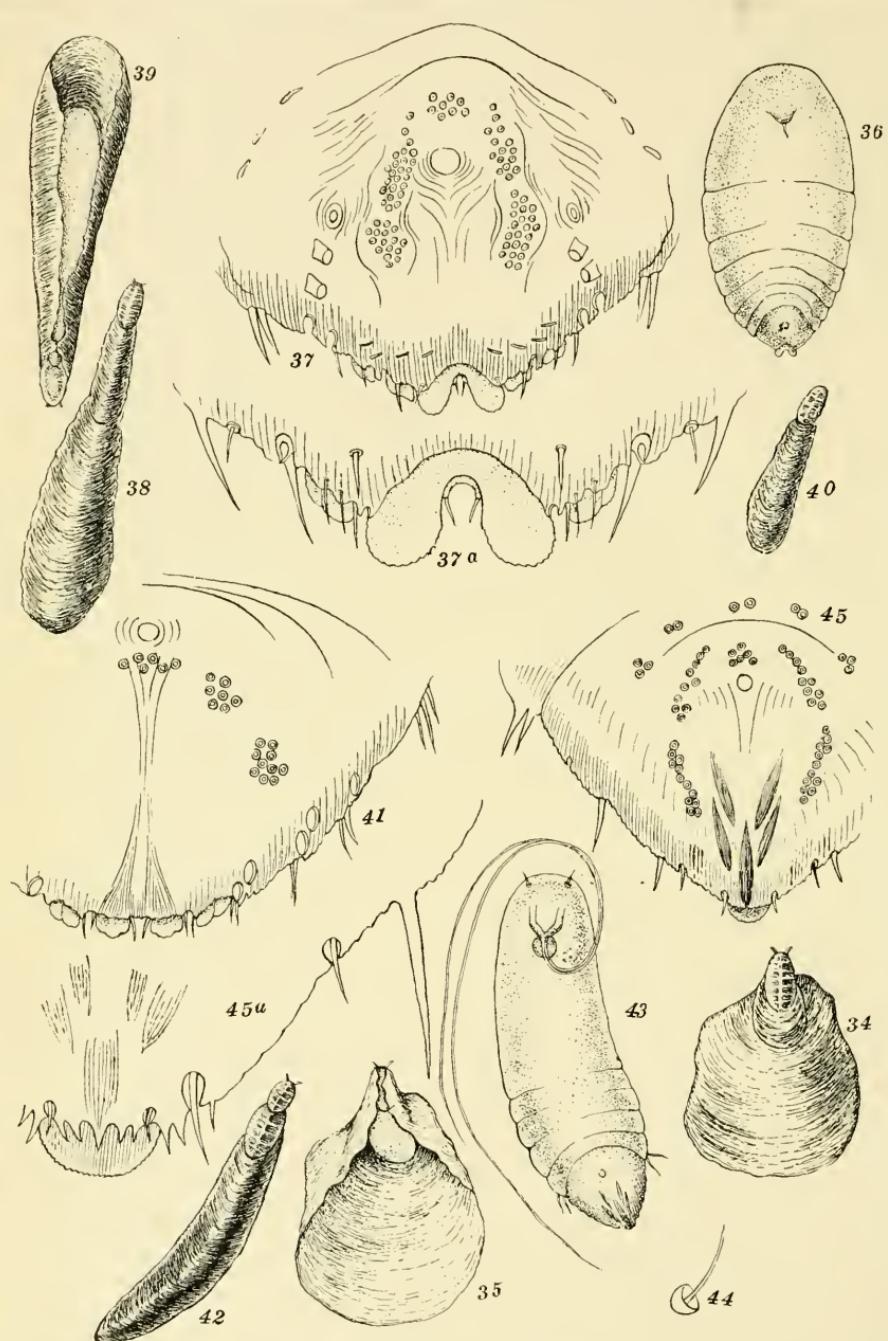
This species is allied to *Lecanium viride* Green, but there are many differences in the formula of the antenna.

11. *Aspidiotus (Chrysomphalus) aurantii* var. *citrinus* Coq.

This species is one of the common scale insects of *Citrus* in Japan, but it is not very destructive.

12. *Aspidiotus (Chrysomphalus) rossi* Mask.

Shizuoka and Chiba, on leaves and branches of *Pasania cuspidata* Oerst., collected by the writer, 1907.



Japanese Coccidae.

13. *Chionaspis (Phenacaspis) aucubæ* Cooley.

Tokyo, on *Aucuba japonica* Thunb., collected by the writer at Hibiya Park, Tokyo City, September, 1907.

14. *Chionaspis (Phenacaspis) latissima* Ckll.

This species is very common all over Japan on leaves of *Distylium racemosum* S. et Z.

15. *Chionaspis kinshinensis*, new species. (Pl. IX, Figs. 34-37.)

Female Puparium.—Pale straw color, opaque, rather thick in texture, very broadly and roundly dilated, so that the width usually equals the length; slightly convex. Pellicles pale; first exuvia oblong, segmentation distinct, last abdominal segment yellow, about .3 mm., second exuvia subcircular, about .5 mm. Ventral scale white, very thin. Size about 2 mm.

Male Puparium.—Unknown to the writer.

Adult Female.—Oblong, slightly pinkish in color; abdominal segments distinct. Last abdominal segment presenting the following characters: The anterior group of spinnerets consists of five to eight, the anterior laterals twenty to twenty-five, posterior laterals about twenty-one. The median lobes are large, oblong, contiguous at the proximal end, and widely separated at their distal extremities; their margins serrate; the second lobes of each side incised near its lateral end, the mesal lobule being almost three times as large as the lateral; third lobes well formed, with incision at middle, the mesal lobule being larger than lateral. The plates are arranged as follows: 1, 1, 2; the first one between mesal and second lobes, the second between second and third lobes and the third beyond the third. Spines as usual.

Fukuoka, on the trunk of *Quercus* sp., collected by the writer, 1907.

This species is allied to *Chionaspis colemani* Kuw. in the shape of scale, color and texture, but is distinguished from the latter by the structure of the last abdominal segment.

16. *Mytilaspis (Lepidosaphes) buzenensis*, new species. (Pl. IX, Figs. 38-40.)

Female Puparium.—Long and narrow, straight, widening gradually toward posterior extremity. Color dark brown, opaque, with a very narrow, irregular, flattened border, which is whitish gray and transversely marked by curved lines of growth. Palicles very pale yellow, subtransparent, occupying about one third the total length of the scale; the first exuvia oval; segmentation distinct; antennal filaments well seen, about .3 mm. long; second exuvia very much larger than the first, posterior extremity yellow, about .8 mm. Ventral scale incomplete, broadly divided. Length about 2.5-3 mm., width about .5 mm.

Male Puparium.—Very much resembles that of female, but smaller; line of

growth not so pronounced; pale brown in color; irregular whitish flattened border almost wanting; ventral scale incomplete. Length about 1.5 mm.

Adult Female.—Long elliptical, lateral margins nearly straight, slightly wider toward posterior end. The last abdominal segment presents the following characters: The anterior group of spinnerets are six; the anterior laterals about seven, and the posterior laterals about nine. The median lobes well developed with the margins crenate, the second lobe deeply incised, the margins of the lobules crenate; the third lobe is wanting. The plates are not very large, but prominent and simple, tapering; there are two of them in each of the following places: between median lobes, between first and second lobes, and several more beyond the second lobes. Spines prominent, one on the base of each lobe. Length about 1.65 mm., width .5 mm.

Buzen, Kiushiu, on vine, collected by the writer, June, 1907.

The present species is allied to *Mytilaspis gloveri* Pack., but the large second exuvia and rather short scale widening gradually toward posterior extremity are good characters for separating it from the latter.

17. *Mytilaspis (Lepidosaphes) uniloba*, new species. (Pl. IX, Figs. 42-45.)

Female Puparium.—Long and narrow, straight or curved; sides almost parallel, but slightly widening toward the posterior extremity, with whitish, narrow, flattened border. Color dark brown, with pale margin; the older specimens pale white. Pellicles pale yellow, occupying about one third the total length of the scale. The first exuvia oval, about .3 mm., cross ridges well marked; second exuvia large, about .6 mm. Ventral scale incomplete. Length 2-3 mm., width about .5 mm.

Male Puparium.—Unknown to the writer.

Adult Female.—Pale yellow, with the last abdominal segment yellow; elongate in form, lateral margin straight, and approximately parallel; the abdominal area being wider than the anterior parts. The abdominal segments short, the lateral margins not much produced; next to the last abdominal segment with two stout, spine-like processes and many short spines. The last abdominal segment presents the following characters: The anterior group of spinnerets four, the anterior laterals ten to twelve, and the posterior laterals eleven to fourteen (some specimens show three or four more groups of spinnerets above the anterior group, which is shown in the figure). There is only a single lobe which is very large and crenate; four simple plates on each side, two of them are very large, while the other two are smaller. Length about 1.5 mm., width about .5 mm.

Habitat.—Hiogo, on *Osmanthus*, collected by the writer, March, 1907.

This species can be readily distinguished from all others in the genus by its single median lobe. The supplemental gland pores or spinnerets, shown in the figure do not appear to be constant.

18. Mytilaspis (Lepidosaphes) machili Mask.

Tokyo, on *Machilus thunbergii* S. et Z., collected by the writer, March, 1907. It was recorded from Japan some years ago by Maskell, but this is the first time that the writer has seen the species in his native country.

EXPLANATION OF PLATES.

PLATE VII.

Asterolecanium pasaniae sp. nov. (Kuw. & Ckll.).

Fig. 1. Scales on leaf of *Pasania cuspidata*.

Fig. 2. Female scale from above.

Fig. 3. Female from below.

Fig. 4. Antenna of the same.

Fig. 5. Marginal glands of the same.

Fig. 6. Abdominal end of the same.

Lecanium fukayai sp. nov.

Fig. 7. Adult female from below.

Figs. 8, 8a. Antennæ of the same.

Figs. 9, 9a. Leg of the same.

Fig. 10. Anal plates of the same.

Lecanium ochraceæ sp. nov.

Fig. 11. Female from above.

Figs. 12, 12a. Antennæ of the same.

Figs. 13a, 13b, 13c, 13d. Legs of the same.

Fig. 14. Marginal and stigmatic spines of the same.

Fig. 15. Anal plates of the same.

PLATE VIII.

Lichtensis japonica sp. nov.

Figs. 16a, 16b, 16c. Female, different stages prior to the formation of the ovisac.

Fig. 17. Female with ovisac.

Fig. 18. Female from below.

Fig. 19. Antenna of the same.

Figs. 20, 20a. Leg of the same.

Fig. 21. Marginal spines.

Fig. 22. Stigmatic spines.

Fig. 23. Spiracle.

Fig. 24. Anal ring and plates.

Fig. 25. Eggs.

Fig. 26. Antenna of first larval stage.

Fig. 27. Anal plates of the same.

Takahashia citricola sp. nov.

Fig. 28. Female, natural size.

Fig. 29. The same, enlarged.

Fig. 30. Antennae of the same.

Fig. 31. Leg of the same.

Fig. 32. Marginal and stigmatic spines of the same.

Fig. 33. Anal plates.

PLATE IX.

Chionaspis kinoshinensis sp. nov.

Fig. 34. Female scale from above.

Fig. 35. The same from below.

Fig. 36. Female.

Fig. 37. Last abdominal segment of the same.

Mytilaspis buzenensis sp. nov.

Fig. 38. Female scale from above.

Fig. 39. The same from below.

Fig. 40. Male scale from above.

Fig. 41. Last abdominal segment of female.

Mytilaspis uniloba sp. nov.

Fig. 42. Scale of female from above.

Fig. 43. Female from below.

Fig. 44. Antenna of the same.

Figs. 45, 45a. Last abdominal segment of the same.

COCCIDÆ OF JAPAN (IV). A LIST OF COCCIDÆ
FROM THE BONIN ISLANDS (OGASAWARA-
JIMA), JAPAN.

BY S. I. KUWANA, A.M.,

IMPERIAL AGRICULTURAL EXPERIMENT STATION,
NISHIGAHARA, TOKYO, JAPAN.

(WITH PLATES X-XII.)

The following species of Coccidæ or scale insects were collected by the writer in the Bonin Islands, where he was sent by the Department of Agriculture and Commerce for the purpose of investigating the migratory locust of the islands, in the summer of 1907.

The most striking feature of the collection is the comparative cosmopolitan character of the species. Not a single species peculiar to the islands was found; even the new species described below being all closely allied to well-known and widely distributed forms. The species affecting fruit trees (*Citrus*, etc.) were introduced with nursery stock quite recently.

The writer is under great obligation to Prof. T. D. A. Cockerell, for kindly revising his manuscript.

1. Lecanium (Saissetia) hemisphæricum L.

On *Coffea arabica*, "Shirotsugi," "Shiroki," *Boehmeria densiflora*.

Other Localities.—Europe, New Zealand, Australia, Mauritius, Hawaii, Galapagos, Brazil, United States, Mexico, mainland of Japan.

2. Lecanium (Saissetia) nigrum Nietn.

On *Boehmeria densiflora*, *Terminalia catappa*, *Celtis sinensis*, *Solanum melongena*, "Shirotsugi."

Other Localities.—Ceylon, India, Demerara, Mauritius, Hawaii, Grenada, Br. Guiana, Barbados, Trinidad, Porto Rico, Australia, New Zealand, mainland of Japan.

3. Lecanium (Coccus) hesperidum L.

On *Ardisia sieboldi*, *Hibiscus tiliaceus* var. *glabra*.

Other Localities.—Europe, New Zealand, S. Africa, Hawaii, Chili, Mexico, Algeria, West Indies, United States, Canada, mainland of Japan.

4. Lecanium (Coccus) frontale Green.

On "Shirotsugi."

Other Localities.—Ceylon.

5. Pulvinaria aurantii Ckll.

On *Citrus* sp. Very badly infested by a fungus.

Other Localities.—Mainland of Japan.

6. Ceroplastes floridensis Comst.

On a species of willow? Not common.

Other Localities.—United States, Mexico, West Indies, Hawaii, Ceylon, India, Brazil, Darjeeling, Assam, Australia, mainland of Japan.

7. Aspidiotus (*Chrysomphalus*) *ficus* Ashm.

On *Citrus decumana*, *C. aurantium*, *Ardisia sieboldi*, *Artocarpus integrifolia*, *Citrus medica*, *Ligustrum medium*, "yellow wood."

Other Localities.—Europe, Egypt, Ceylon, India, Mauritius, Natal, Australia, Brazil, Jamaica, Barbados, United States, Mexico, mainland of Japan.

8. Aspidiotus (*Chrysomphalus*) *aurantii* Mask.

On *Ligustrum japonicum*, *Artocarpus integrifolia*.

Other Localities.—S. Europe, Syria, Natal, Cape Colony, Mauritius, Ceylon, China, Australia, New Zealand, Samoa, New Caledonia, Fiji, Hawaii, West Indies, United States, mainland of Japan.

9. Aspidiotus (*Odonapis*) *secretus* Ckll.

On *Arundinaria sineconi*.

Other Localities.—Hawaii, mainland of Japan.

10. Aspidiotus *cydoniae* Comst.

On *Pyrus sinensis*, *Melia japonica*.

Other Localities.—United States, Mexico, West Indies, Ceylon, Samoa, mainland of Japan. It seems to the writer that the scale of the female is somewhat smaller than in the typical form, and may be it is a new variety. Owing to the very few specimens, the writer could not make any farther study.

11. Aspidiotus *rapax* Comst.

On *Celtis sinensis*, *Canavallia ensiformis*, *Syzygium cleyeræfolium*, *Pyrus malus*, *Artocarpus integrifolia?*, *Cinnamomum pedunculatum*, *Ficus variolosa*.

Other Localities.—United States, West Indies, Brazil, Europe, Hawaii, New Zealand, S. Africa, Australia, Natal, Yokohama, Japan.

Somewhat smaller than the typical California specimens.

12. Fiorinia *fioriniæ*? Targ.

On *Artocarpus integrifolia?*

13. Fiorinia sp.

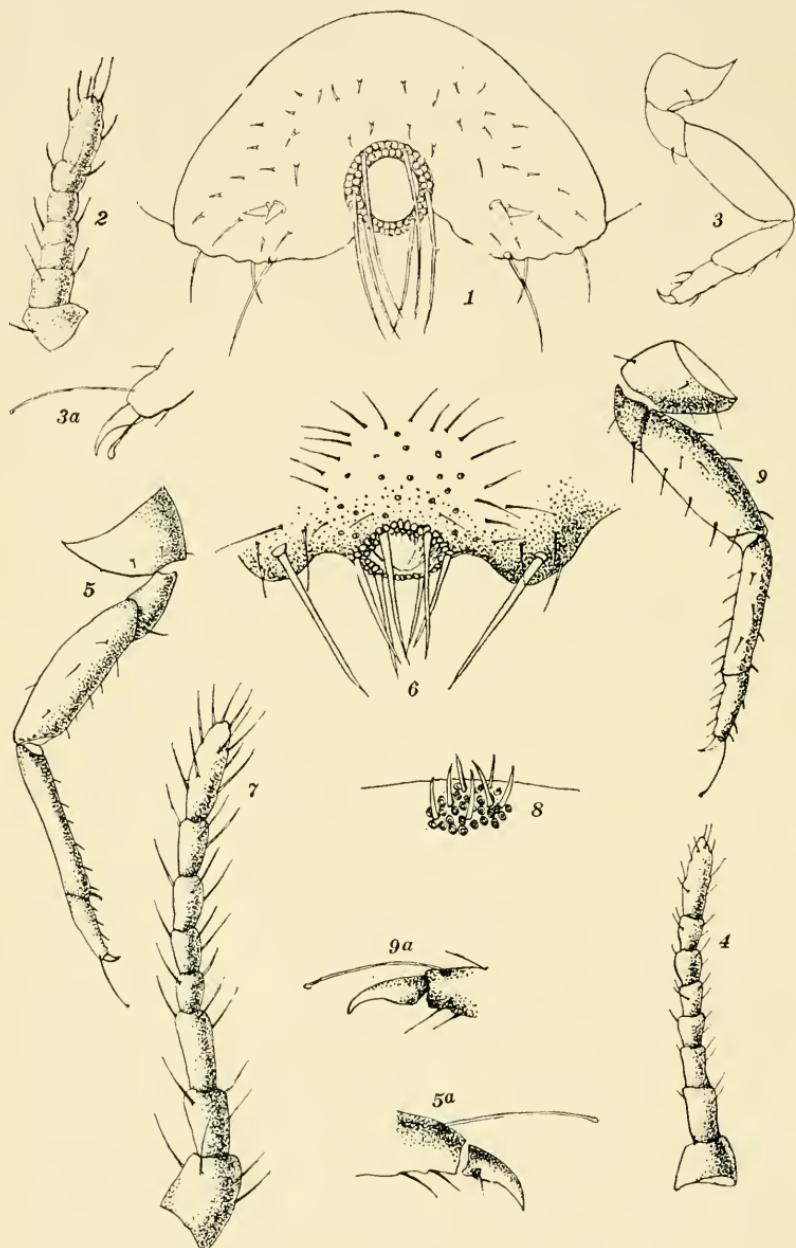
On *Pinus luchuensis*.

Very few specimens which could not be further studied.

14. Parlatoria *proteus* Curt.

On *Citrus* sp.

Other Localities.—Europe, United States, Australia, China, Brazil, Hawaii, mainland of Japan.



Japanese Coccidae.

15. *Mytilaspis pallida* Green.

On *Citrus* sp.

Other Localities.—Ceylon, Hawaii, mainland of Japan.

16. *Howardia biclavis* Comst.

On *Celtis sinensis*, *Ostromeles anthyllidifolia*, *Thea japonica*, *Photinia wrightiana*, *Papaia*, *Olea europaea*, *Hibiscus tiliaceus*, *Trachospermum jasminoides*, "Chigi," *Sideroxylon ferrugineum*, *Maba buxifolia*, *Artocarpus integrifolia?*, *Terminalia catappa*, *Diospyros kaki*, *Syzygium cleyceræfolium*, "Komaiki," *Lagerstræmia indica*, *Sideroxylon* sp., *Punica granatum*.

Other Localities.—United States, West Indies, Tahiti, Ceylon, Hawaii, Mauritius, Europe.

Although this species has been recorded from Japan and elsewhere, the writer has not as yet seen it in his native country.

The following species are here formally described as new:

17. *Ripersia agasawarensis*, new species. (Pl. X. Figs. 1-3.)

Adult Female.—Elongate oval in form, flat; pinkish purple in color. Antennæ and legs well formed, but small. Antenna 7-jointed; joint seven the longest; formula 7, 2, (6, 1), 4, 5, 3; each joint with a few hairs. Legs subequal; tibia almost twice as long as the length of tarsus; digitules of tarsus fine hairs, those of claw stout and short; claw slender and curved. Anal lobes with two conical spines and about three long hairs. Anal ring with six long hairs. Length about 4 mm., width about 2 mm.

On *Misanthus* sp.

This species is allied to *Ripersia japonica* Kuw., but differs in having two strong conical spines on the anal lobes and in the shape of the antennæ.

18. *Dactylopius (Pseudococcus) boninsis*, new species. (Pl. X. Figs. 4-5.)

Adult Female.—Elongate oval; color reddish gray, covered with heavy white powder; abdominal segments distinct. Antennæ and legs large, well formed. Antenna 7- or 8-jointed, usually the latter; in this case, the eighth joint is the longest and the fourth the shortest, the rest of nearly equal length; formula 8, 2, 3, 1, (6, 7), 5, 4. Legs stout and longer than antennæ. Three pairs subequal, but the first pair is much smaller than the others; with rather fine hairs; tibia more than twice the length of the tarsus; digitules of tarsus fine hairs, those of claw spiny; claw large, curved. Anal lobes normal, each with two strong spines and many long fine hairs surrounded with small spinnerets. Anal ring small, with six hairs. Dermis with minute hairs and small circular spinnerets. Length about 4.5 mm., width about 2.5 mm.

On sugar cane.

This species is closely allied to *D. calccolariæ* Mask, in general form, but differs in having long and rather slender antennæ and legs. The anal ring is also much smaller than that of *D. calccolariæ*.

19. *Dactylopius (Pseudococcus) ananassæ*, new species. (Pl. X. Figs. 6-9.)

Adult Female.—Broadly oval in form; reddish brown in color; covered with white powder; abdominal segments distinct. Antennæ very long; 8-jointed, joint eight the longest, joint one always very broad; formula 8, 3, (1, 2), 7, 6, 5, 4; each joint with many strong hairs. Legs subequal, very stout, hairy; tarsus much shorter than tibia; claw large, curved; digitules of tarsus long hairs, those of claw could not be recognized by the writer. Anal lobes distinct, each lobe with one long and a few fine hairs; anal ring with six prominent hairs. Dorsum with fine hairs and many small circular spinnerets. Length about 3 to 4 mm., width about 2 to 2.5 mm.

On pineapple.

This species closely resembles in form and general characters of antennæ and legs *D. bromeliae* Brom., but the latter is much smaller.

20. *Lecanium (Saissetia) sideroxylium*, new species. (Pl. XI. Figs. 10-17.)

Adult Female.—Suboval in form, anterior edge slightly narrowed, convex. Dorsum with a slight median ridge. Color chestnut brown, almost black. Antennæ usually 8-, sometimes only 7-jointed; third joint the longest, fifth joint the shortest; last few joints with many long hairs; formula 3, (8, 4), 2, 6, 7, 1, 5. Legs well-formed, subequal, slender; tibia and tarsus almost equal in length; claw and digitules normal. Stigmatic cleft deep, with three spines, one long and two short; marginal spines rather large, flattened at extremity, the flattened edge deeply emarginate. Anal cleft deep, the two edges almost united; anal plates large, outer angle round, four large and long spines near inner angle and two short ones near apex. Derm closely covered with a conspicuous tessellation of irregularly polygonal cells, each with a median pale oval spot and a minute translucent pore in the center. Length about 4 mm.

On *Sidcoxylon ferrugineum*.

This species is distinguished from *L. nigrum* Niatn., by a median ridge on the dorsum and by the shape of antennæ.

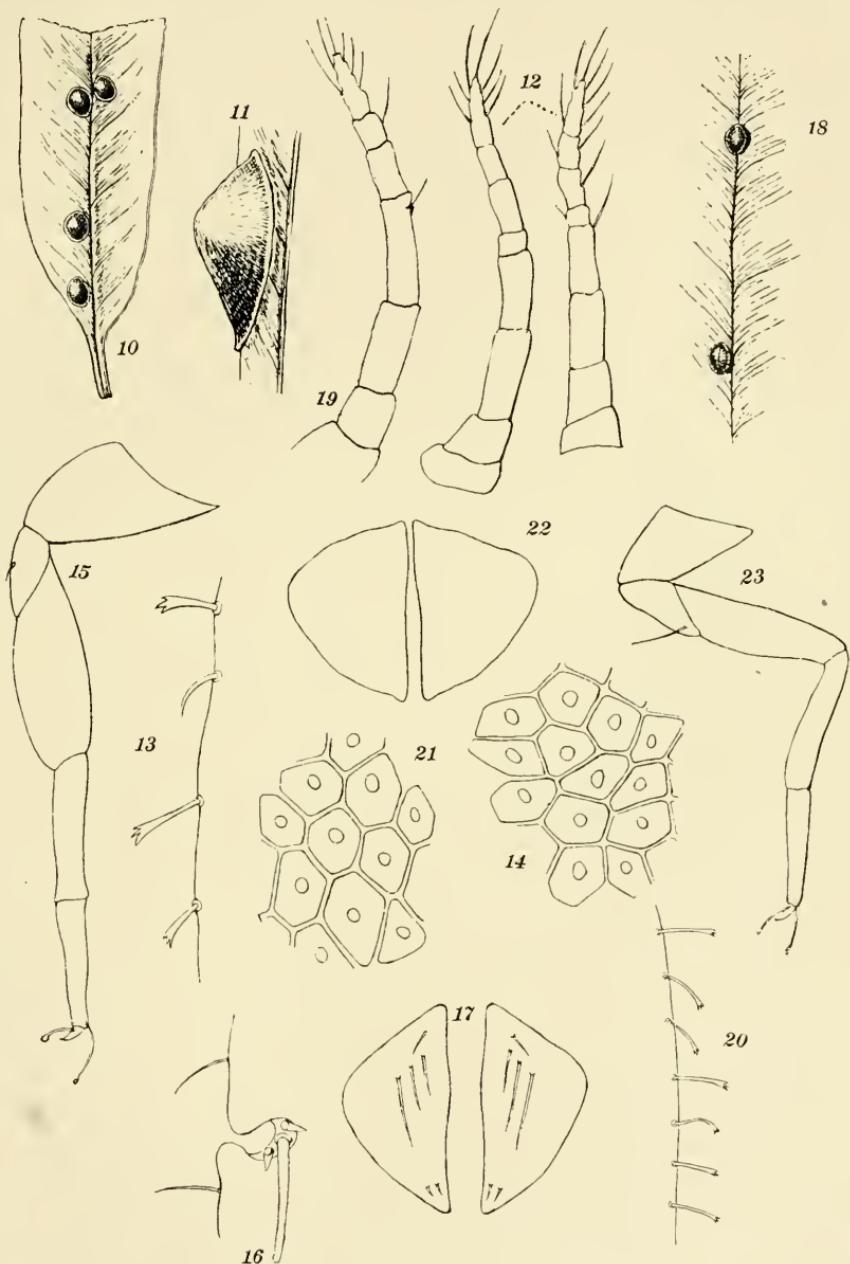
21. *Lecanium (Saissetia) pseudonigrum*, new species. (Pl. XI. Figs. 18-22.)

This species is allied to *L. nigrum*, but differs in the following characters: Very flat, margin sinuous, a slight median ridge and many transverse wrinkles. Length about 3.5 mm. Antennæ 7-jointed; joint four the longest; formula 4, 3, 7, 5, 2, 1, 6.

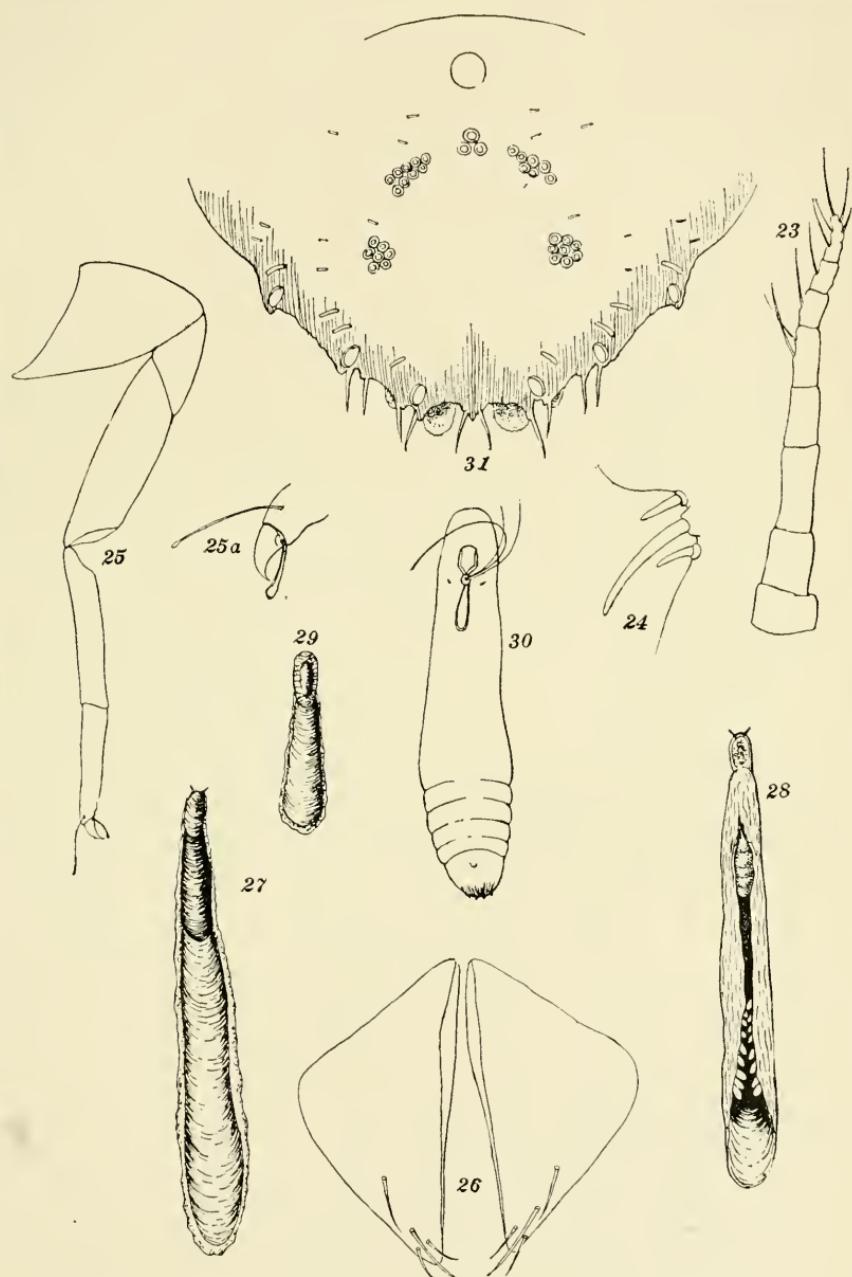
On "Shirotsugi."

22. *Lecanium (Coccus) celtium*, new species. (Pl. XII. Figs. 23-26.)

Adult Female.—Elongate in outline, convex; pale brown or yellowish brown in color. Antennæ and legs well-formed, but small. Antenna 8-jointed;



Japanese Coccidae.



Japanese Coccidae.

joint three the longest; formula 3, 4, (2, 5), 8, 6, 7, 1. Legs subequal, tibia longer than tarsus, claw stout and curved, digitules as usual. Marginal spines simple and pointed; stigmatic cleft not so deep, with one long and two short spines. Anal plates large, and broad; outer edge a little longer than base; outer angle round; with four strong spines near apex. Length about 6.5 mm., width about 3 mm.

On *Celtis sinensis*.

This species resembles, in general form, *L. longulum* Douglas, but differs in the formula of the antenna and in the shape of the anal plates.

23. *Mytilaspis (Lepidosaphus) arii*, new species. (Pl. XII. Figs. 27-31.)

Female Scale.—Very long and narrow, straight, sides parallel, with a narrow, flattened border. Color more or less variable, but usually yellowish brown. Pellicles paler than the scale, occupying about one fourth of the total length of the scale; first exuvia pale yellow, segmentation distinct, about .4 mm.; second exuvia much longer, about .7 mm., posterior end yellow. Ventral scale whitish, well developed, with median longitudinal division attached a little with the margin. Length about 3.5 to 4 mm., width about .4 mm.

Male Puparium.—Resembles that of female, but is much smaller; color pale, with white, flattened border. Pellicle yellow; ventral scale complete. Length about 1 mm.

Adult Female.—Elongate in form, lateral margins straight and approximately parallel. The last abdominal segment presents the following characters. The anterior group of spinnerets consists of three, the anterior laterals of about seven to ten, and the posterior laterals of about seven to nine. The median lobes are very large and wide, with the sides nearly parallel: the second lobe very small, sometimes wanting. The plates are well formed, simple, two between median lobes, two between first and second lobes, and two beyond the second lobe. Spines as usual, and one on the base of each lobe. Length about 1.5 mm.

On *Misanthus* sp.

This species is allied to *M. gloveri* Pack, but differs in having an unusually long, filiform female scale and a small second lobe. Named after Mr. K. Ari, the governor of the islands.

EXPLANATION OF PLATES.

PLATE X.

Ripersia ogasawarensis sp. nov.

1. Abdominal end of female.
2. Antenna of the same.
3. Leg of the same.

Dactylopius boninesis sp. nov.

4. Antenna of female.
5. 5a. Leg of the same.

Dactylopius ananassae sp. nov.

6. Abdominal end of female.
7. Antenna of the same.
8. A group of spines from the lateral aspect of abdominal segment.
9. Leg of the same.

PLATE XI.

Lecanium sideroxylium sp. nov.

10. Female on the host plant (natural size).
11. The same, enlarged.
12. Antennæ of the same.
13. Marginal spines of the same.
14. Marking of derm of the same.
15. Leg of the same.
16. Stigmatic spines of the same.
17. Anal plates of the same.

Lecanium pseudonigrum sp. nov.

18. Female on host plant (natural size).
19. Antenna of the same.
20. Marginal spines of the same.
21. Marking of derm of the same. *
22. Anal plates of the same.

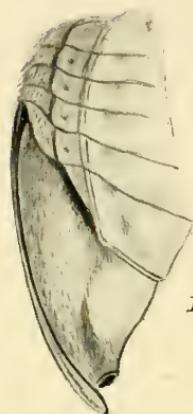
PLATE XII.

Lecanium celtium sp. nov.

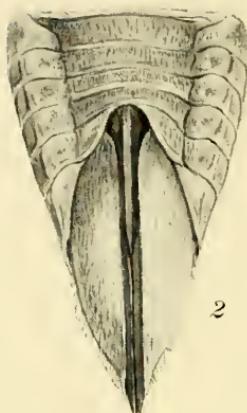
23. Antenna of female.
24. Stigmatic spines of the same.
- 25, 25a. Leg of the same.
26. Anal plates of the same.

Mytilaspis arii sp. nov.

27. Female scale from above.
28. The same from below.
29. Male scale from above.
30. Female.
31. Last abdominal segment of the same.



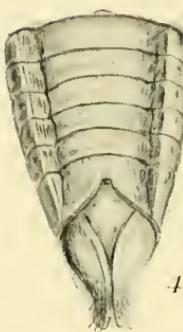
1



2



3



4



5



5a



6

Membracidae.

GYNANDROMORPHIC MEMBRACIDÆ.

BY IGNAZ MATAUSCH,

NEWARK, N. J.

(WITH PLATE XIII.)

While sorting over some insects, I ran across a rather small apparently female, specimen of *Telia bimaculata* (Fabr.) collected two years ago by Mr. Wm. T. Davis on Staten Island, N. Y. On closer examination I saw that it exhibited an abnormal form of the sexual organs which suggested that it might be a gynandromorphic individual. At the suggestion of Professor Wm. M. Wheeler, I studied a series of nymphs which were not fully developed and found that the insect in question was entirely similar to the young males, since the traces of the ovipositor present in the females were completely absent.

Bearing this case in mind while collecting during the past season, I found the occurrence was not unique. Mr. E. A. Bischoff collected five specimens of *Telia* at Rahway, N. J., on August of the present year, and among them was a similar abnormality with the form and color of the prothorax modified, showing that other parts of the body may also become implicated.

Among five specimens of *Telamona ampelopsis* Harris, I found a sexual form of the same sort; and in another species of *Telamona*, which I collected on sweet gum fully 50 per cent. of the specimens were abnormal! They varied from the above mentioned form to ones which showed scarcely any traces of genitalia, and still others with scarcely a trace of the last abdominal segment.

Figs. 1 and 2 on Plate XIII show the abdomen of the normal female *Telia bimaculata* from the left side and in ventral view, Figs. 5 and 6 the abdomen of the normal male in corresponding positions. In Fig. 5a the genitalia of this sex are represented as seen from behind. Figs. 3 and 4 show the abdomen of the gynandromorphic specimen seen from the left side and in ventral view.

CATOCALA HERODIAS STRECKER,
AT LAKEHURST, N. J.

BY CHAS. E. SLEIGHT,

RAMSEY, N. J.

Two specimens of this species of *Catocala* were captured at Lakehurst in July, 1902, by Mr. Louis H. Joutel and Mr. Wm. T. Davis, as recorded in this JOURNAL for June, 1903, page 112. Though the insect has been much sought for at Lakehurst since that time, none has been captured.

It was my good fortune to detect two larvæ of this *Catocala* among the top-most branches of scrub oaks (*Quercus nana*) at the place above mentioned on the twenty-fourth of May, 1909. The weather was wet and cool, which may have some bearing on the larvæ having been found in the position described. They so closely resembled in color, etc., the slender branches of the oak on which I found them that they appeared to be excrescences of the branch itself and I called Mr. Davis to show him the malformation. It was not until we had touched it that we were aware we had to do with a larva. I took these larvæ home and, while both reached the pupal stage, one died. The healthy one pupated June 1 and emerged July 6.

Now that the food plant is definitely known, other specimens of this rare insect can, no doubt, be collected more easily.

A NEW CHALCIDOID GENUS AND SPECIES OF
THE FAMILY MYMARIDÆ FROM ILLINOIS,
PARASITIC ON THE EGGS OF THE WEEVIL
TYLODERMA FOVEOLATUM (SAY).

BY A. A. GIRAULT,

.URBANA, ILLINOIS.

CHALCIDOIDEA.

Family MYMARIDÆ.

Subfamily MYMARINÆ.

Tribe ANAPHIRINI.

Anaphoidea, new genus.

Type:—*Anaphoidea sordidata* new species, described below.

Normal position.

Normal for the tribe and moderate in size; antennal club divided. Allied with and resembling the genera *Anaphes* Haliday, *Anagrus* Haliday and *Paranagrus* Perkins.

Female.—Head (cephalic aspect) rounded, slightly wider than long, the face subquadrate and broad, concave, the eyes over half the length of the cheeks, the face on each side with a narrow sulcus running from vertex to clypeus along the inner (mesal) margins of the eyes and continued (dorsal aspect) caudad around the mesal eye margins, then laterad and ventrocephalad following around the outer (lateral) eye margins; the sulci of each side are joined by a similar but transverse sulcus across the cephalic margin of the vertex or just preceding that margin. Apical (ventral) margin of clypeus regularly concave, entire; clypeal sutures obsolete. Lateral aspect of head elliptical ovate in outline, the eyes ovate; scapes of the antennæ projecting above (dorsad) the line of the vertex. Vertex wide between the eyes, rectangular, widening caudad, sloping gently cephalad; a fourth wider than long, its cephalic margin subacute, straight, its caudal margin slightly concave, subobtuse; plane of the vertex somewhat convex caudad, the three ocelli in a flatly curved line across the caudal third, the lateral ocelli not touching the eye margins; head distinctly wider than the greatest width of the thorax, non-punctate, finely lined. Antennæ inserted somewhat above (dorsad) the middle of the face, five-eighths the distance up the eye margins, hence distinctly dorsad of an imaginary line drawn between the ventral ends of the eyes, their bulbs widely separated, near the eye margins, at least three times further from each other than each is from the respective eye margin, 10-jointed, capitate, the funicle filiform, the club 2-jointed, ovate and

forming a head to the funicle, the proximal funicle joint small, distinctly shorter and narrower than the pedicel and much shorter than any of the following joints, somewhat like a ring-joint; scape usual. Mandibles acutely tridentate, the mesal (inner) tooth shortest, the lateral two distinctly larger, the intermediate tooth slightly longer, longest of the three.

Pronotum narrow, barely visible from dorsal aspect. Parapsidal furrows distinct, complete, widely separated; axillæ obscure; scutellum large, longer than the mesoscutum, peltate, non-punctate, convex; mesopostscutellum narrow, curved. Metanotum short at the meson, lengthening considerably laterad, the minute round spiracle borne in the center of the dorso-lateral aspect at the outer apex of a delicate V-shaped sulcus whose arms diverge caudo-mesad; this sulcus is included within a larger V-shaped sulcus whose arms point in the same direction and whose apex is cephalo-laterad of the spiracle. (Direct dorsal aspect of metanotum hidden.) Thorax slightly shorter than the abdomen.

Abdomen ovate or egg-shaped, sessile, the second segment longest, not more than a fifth of the total length of the abdomen, segments 3 and 4 subequal, each a fourth shorter than segment 2, the caudal end of segment 4 reaching to about the middle of the abdomen; segment 5 still shorter; caudal margins of segments 2-5 straight. Ovipositor issuing from the caudal tip end of the abdomen, but inserted far cephalad as in other Chalcidoidea.

Legs normal; trochanters 2-jointed, tarsi 4-jointed; tibial spurs single, moderate, the anterior tibial spur longer, stronger, forked near tip, the two tines of the fork slender, acuminate. Tarsal joints subequal, longer than the tibial spurs, the proximal and distal joints more nearly equal and slightly longer than the second and third joints. The usual row of stiff bristles in juxtaposition to the cephalic tibial spur present along the ventral surface of the proximal joint of the cephalic tarsi forming with the tibial spur, the antennal comb or cleaner. Cephalic coxae more globular than the conical intermediate coxae.

Forewings normal, with discal cilia which are moderately long and coarse and with moderately long marginal cilia; the usual dilatation or excision along the caudal margin near the base of the wing; delicately fumated; marginal vein not lengthened, about three times longer than broad. Posterior wings delicately petiolate, feather-shaped, with complete marginal cilia; discal cilia sparse; delicately fumated.—From recently killed, unmounted specimens, excepting in the cases of the wings, antennæ, legs and mandibles which were described from specimens mounted in xylol-balsam. ($\frac{2}{3}$ -inch objective, 1-inch optic, Bausch and Lomb.)

Male.—The same as the female, excepting the more rounded abdomen and the longer, slender filiform antennæ which are 12-jointed, the joints not varying much in length. Intromittent organ when exserted long, slender and curved, simple.

A genus agreeing closely with *Anaphes* Haliday in general habitus, wing venation and other characters, but differing from it in

having in the female an additional antennal joint, the club being divided obliquely; the males are similar to the males of *Anaphes*. It need not be confused with either *Anagrus* Haliday or *Paranagrus* Perkins if attention is given to venation and antennal characters, the antennæ of both genera being 9-jointed in the female, 13-jointed in the male and in the female of *Paranagrus* the proximal funicle joint is noticeably lengthened so as to be nearly equal to the others, not distinctly, abruptly shorter than the second funicle joint as in the other genera mentioned. The type species is described in following:

***Anaphoidea sordidata*, new species.**

Female.—Length, 0.85 mm., average. Moderately large. Visible to naked eye.

Body uniformly deep shining black with some purplish, the abdomen with some brownish, the eyes and ocelli dark garnet, not much lighter than the body, the antennæ dusky black, excepting the scape and pedicel which are pallid yellowish, darker dorsad and ventrad, the funicle and club showing a light close, grayish pubescence. Coxæ concolorous with the body; trochanters pallid; the remaining portions of the legs neutral yellowish but the femora and lateral aspect of the posterior tibiae are distinctly darker to dusky; distal tarsal joint dusky black. Venter concolorous.

Face delicately irregularly longitudinally lined with fine close striae, as are also the cheeks, the striations on the vertex more regular, transverse, uniform; the thoracic nota similarly lined, longitudinally so, more regular and uniform on the long mesoscutellum; eyes comparatively coarse, bearing a few minute hairs. The lateral ocelli about their own width from the respective eye margins and separated from the latter by portions of a narrow sulcus; lateral ocelli nearly twice farther apart from each other than each is from the cephalic ocellus and twice the distance from the latter than each is from the respective eye margin; lateral ocelli about three-fourths their own width from the caudal margin of the vertex. Abdomen with polygonal sculpturing. Legs hairy; body sparsely so.

Fore wings moderately closely ciliate in the disk (about from 12 to 15 rows across the widest part), the discal cilia moderately long and coarse, but not a third as coarse as the marginal cilia, absent directly laterad of the distal end of the marginal vein for over the latter's length and also directly caudad and proximad of the marginal vein, excepting for a single row along side of the caudal edge of the marginal vein, running distad to the ciliated area and another row running obliquely (caudo-distad) across the center of the naked area caudad of the marginal vein, from the latter, including between it and the other row of cilia a V-shaped naked area whose apex points proximad. In this proximal, nearly naked area is also borne a single, distinct, isolated cilium about in its center but nearer the caudal wing margin. Marginal cilia of the fore wing moderate in length, extending completely around the

wing from the marginal vein, but absent proximad (on the caudal margin absent for a farther distance distad); longest along the caudal margin at the distal fifth, shorter at the extremity of the wing and proximad on both margins and shortest proximad at the caudal margin. Fore wings broadest at the distal fifth, the usual dilatation of the caudal margin opposite to the marginal vein and merely a broad convexity; the last, most proximal of the marginal cilia of the caudal margin about equal to the discal cilia. Fore wing oar-shaped, delicately but distinctly fumated, excepting for a single subquadrate transparent area caudad of the submarginal vein; margins of the blade-shaped or main portion of the wing, distad of the venation, dusky yellowish, as is also the venation.

Posterior wings delicately petiolate, feather-shaped, delicately fumated, the petiole slightly less than a fifth the total length of the wing and including most of the venation; distad of the petiole, wing linear but curved, the cephalic margin broadly concave, the caudal margin broadly convex, the blade of the wing obliquely truncate proximad at the petiole and the marginal vein; acuminate. Its marginal cilia complete, those of the caudal margin longest, over twice as long as the wing is wide and twice the size of the cilia of the cephalic margin; discal absent in the proximal half of the blade, excepting the usual inconspicuous, longitudinal double row of them arising from near the bases of the marginal cilia and running distad; in the distal half of the blade but a single row of about from 7-15 running along the center of the blade; this row becomes somewhat confused at the apex.

Scape slightly swollen or convex ventrad, slightly longer than the club, as long as the first and second funicle joints united, twice the length of the pedicel, its dorsal margin but very slightly convex; pedicel obconic, three times the size of the small proximal funicle joint and not more than half the length of the second funicle joint but wider at its apex than any of the funicle joints; proximal funicle joint somewhat like a ring-joint but slightly longer than wide, minute, subglobose, about a fourth or fifth the length of the second funicle joint and somewhat narrower, the smallest antennal joint and conspicuous as such; second funicle joint abruptly longer, the longest antennal joint with the exception of the scape, very slightly longer than funicle joint 3; funicle joints 3 and 4 subequal, each slightly shorter than funicle joint 2 and slightly longer than funicle joints 5 and 6 which are subequal and about a fourth shorter than funicle joint 2; funicle cylindrical, 6-jointed; club ovate, divided obliquely slightly distad of its center, hence 2-jointed, as a whole widest at its middle and somewhat shorter than the combined lengths of the fifth and sixth funicle joints, its greatest width about twice that of the joints of the funicle, its proximal joint obconic, its apex obliquely truncate, longer than the apical joint which is conic, its apex sub-obtuse and its base obliquely truncate. Distal lateral angles of joints 3-6 of the funicle, when seen in outline, slightly acute, the distal margins of these joints acute. Club joints with distinct longitudinal ridges (balsam mounts).

Male.—The same, with the exception of the usual secondary characters pointed out in the generic description.

Antennæ 12-jointed, filiform, longer than the body, the funicle joints not differing abruptly in size, but gradually shorter distad. Pedicel smaller than in the female, oboconic, its sides rounded or convex as seen in profile, wider than the proximal funicle joint and not more than half its length; joints 1-8 of the funicle subequal, long, cylindrical, longitudinally carinate, gradually becoming narrower distad, the carinations forming acute points at the distal ends; joint 9 of the funicle slightly shorter, the same; the distal or club joint a third shorter than either of the joints 1 to 8, slightly narrower, carinate and with a slight nipple at the center of its extremity. Scape slenderer than in the female. Antennæ with very fine, moderately close hairs.

($\frac{3}{8}$ -inch objective, 1-inch optic, Bausch and Lomb.)

Types:—Accession No. 41651, Illinois State Laboratory of Natural History, Urbana, Illinois, 1 ♀ in xylol-balsam (1 slide), 2 ♂'s tagmounted. (Centralia, Illinois, June 26, 1909.) *Cotype*:—No. 12633, U. S. National Museum, Washington, D. C., 1 ♀ in xylol-balsam.

Described from 5 males and 3 females reared June 26 (2 ♂'s, 1 ♀ types), 27 (1 ♂, 1 ♀), 30 (1 ♀) and July 4 (2 ♂'s), 1909, at Centralia, Illinois, from the eggs of the common weevil *Tyloderma forcolatum* (Say) in the stems of the weed *Oenothera biennis* Linneaus. The parasite is solitary as shown by dissection, the body of its pupa filling nearly the entire cavity of the host egg. It is not rare in this vicinity.

The foregoing descriptions were made from recently killed specimens, the coloration and sculpture, shape of the head, abdominal segments and so on from unmounted ones, the antennæ, legs and wings being described from specimens mounted in balsam. It should be stated, therefore, that shortly after death, in tag-mounted specimens, the body begins to shrivel, the face shrinks and caves in making the vertex acute and placing the cephalic and lateral ocelli in different aspects, the thorax contracts somewhat and other parts are so warped that it is impossible to make out true relationships after they have been dead several hours.

Anaphes conotracheli Girault, a species closely related to the type species just described, belongs to *Anaphoidca*.

OBSERVATIONS ON SOME EUROPEAN ANTS.*

BY WILLIAM MORTON WHEELER,

BOSTON, MASS.

A sojourn of a few months during the past summer (1909) in Switzerland and Italy has enabled me to continue my observations begun in the former country during the summer of 1907.† For the past forty years the ant-fauna of these countries has been so diligently studied by Professors Forel and Emery, that one can expect to find little that is new except in localities which their very busy lives have prevented them from exploring. The following notes, therefore, owe their interest to the fact that I was able to visit two of the tributary valleys of the Rhone, which, I believe, have never been explored by myrmecologists. Through the courtesy of Prof. Ed. Bugnion, of Lausanne, I was asked to accompany the annual field excursion of the "Murithienne," a flourishing Valaisian natural history society, to the Turtmann Glacier (July 19-21), at the head of the stream of the same name, and later I spent a week (Aug. 10-18) collecting at Zermatt, in the adjacent valley of the Matter-Visp. Three of the following notes relate to some parasitic ants found in these localities; the fourth relates to a diminutive, non-parasitic form that occurs on the island of Lido, near Venice.

I. *Formica rufa* L.

A few years ago‡ I predicted that this conspicuous European ant, which builds great mounds in the forests throughout the northern and central portions of the continent and above an elevation of about 1,000 m. in the Alps, would eventually be found to be a temporary parasite, during the earliest stages of its colonial life, on the common *F. fusca*. I was led to make this prediction, first, because I had found some of our North American allies of *F. rufa* (*F. consocians*,

* Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 11.

† Comparative Ethology of the European and North American Ants, *Journ. Psych. u. Neurol.*, XIII, 1908, pp. 404-435, pls. III and IV, 6 text figs.

‡ A New Type of Social Parasitism among Ants, *Bull. Amer. Mus. Nat. Hist.*, XX, Oct. 11, 1904, pp. 347-375.

microgyна, dakotensis, exsectoides, etc.) to be temporary parasites on *F. incerta* and *subsericea*; second, because Forel and Wasmann had recorded the occurrence of a few small, mixed colonies of *fusca* with allies of *rufa* (*F. pratensis*, *truncicola*, *exsecta* and *pressilabris*); and third, because, notwithstanding the abundance of *F. rufa* in many parts of Europe, no one had ever seen one of its females in the act of establishing a colony independently.

After finding *F. truncicola* to be, as I had predicted, a temporary parasite on *fusca*, Wasmann undertook a number of experiments with a view to determining the behavior of *rufa* towards this species.* He introduced recently fecundated queens of *rufa* into artificial nests containing *fusca* workers and pupae, with results that led him to infer that the adoption of the *rufa* queen by the *fusca* workers is accomplished with greater difficulty than that of the *truncicola* queen, and that the *rufa* queen often behaves like the *sanguinea* queen under the same circumstances, *i. e.*, kills a number of the *fusca* and collects and guards their pupae till the callow workers hatch and adopt her.

While I was in Switzerland I did not have the facilities for performing experiments like those of Wasmann, but I was able to make the three following observations, which show that, under natural conditions, *F. rufa* is, in all probability, a typical temporary parasite like *consocians* and *truncicola*, and does not establish her colonies after the manner first observed by myself in the American forms of *sanguinea*† and subsequently confirmed for the European type of this species by Viehmeyer‡ and Wasmann.§

1. July 20 I found just below the lateral moraine of the Turtmann Glacier, at an altitude of about 2,000 m., a large nest of *F. fusca* under a small pile of flat stones. This nest contained several hundred *fusca* workers, several pupae and larvae, but no queen of this species. In the midst of the colony, however, there was a fine *rufa* queen, at once recognized by her size, red thorax and glabrous gaster. She had

* Weitere Beiträge zum sozialen Parasitismus und der Sklaverei bei den Ameisen. *Biol. Centralbl.*, XXVIII, 1908.

† On the Founding of Colonies by Queen-ants, with Special Reference to the Parasitic and Slave-making Species. *Bull. Amer. Mus. Nat. Hist.*, XXII, 1906, pp. 33-105.

‡ Zur Koloniegründung der parasitischen Ameisen. *Biol. Centralbl.*, 1908, pp. 18-32.

§ Weitere Beiträge, etc., loco citato.

undoubtedly been adopted by the black workers and was in good standing in the community, as was shown when she was confined in a large bottle with a lot of the workers.

2. Later on the same day I found somewhat further down the Turtmann valley (alt. about 1,900 m.), between the foot of the glacier and the hamlet Gruben, a second much smaller colony, comprising only 50–80 *fusca* workers, several sexual larvae of this species and a single *rufa* queen, which was also living on the best of terms with the workers. There was no *fusca* queen. Lying close together in the very center of the nest in one of the superficial chambers were four dead but perfectly fresh *rufa* queens, each with her body cut in two at the petiole. Apparently, therefore, five *rufa* queens had successively sought adoption in this nest, but four had been killed by the *fusca* workers (or by the *rufa* queen?) and only one had been able to prove her right to adoption.

3. August 11 I found under a small flat stone a few hundred yards from the foot of the Boden Glacier near Zermatt, at an altitude of about 2,000 m., a little colony comprising only about a dozen *fusca* workers, two dozen very small *rufa* workers, a *rufa* queen and about 50 larvae and pupae of the latter species. This colony resembled in every respect the small mixed colonies of *F. consocians* and *incerta* which I have repeatedly found at Colebrook, Conn. It was undoubtedly a colony in its second year, still containing the last survivors of the original *fusca* colony, which were destined to die off in the course of a few months or years and leave behind a pure colony of *rufa*. The two mixed colonies found in the Turtmann valley had evidently just been formed. In all three cases the absence of the *fusca* queens was very striking, since in the various localities which I visited in the Turtmann and Visp valleys nearly every colony of *fusca*—and I examined hundreds of them at different elevations, even up to nearly 3,000 m. on the Gorner Grat—contained from two to six deälated queens. These were always enjoying the warmth of the superficial galleries, where they were at once noticed as soon as the stones covering the nests were removed.

These three colonies, therefore, point to a method of colony formation by *rufa* quite like that of *F. consocians* and *truncicola*, and lend no support to Wasmann's view that the *rufa* queen, under natural conditions, behaves like *sanguinea*. The first observation shows, moreover, that the *rufa* queen may be adopted by a large

and vigorous *fusca* colony. The presence of sexual larvae in the second colony shows that the adoption of the alien queen must have taken place a short time before I found the nest, and the presence of four dead *rufa* queens in this nest indicates either that the intrusion of this species must be very vigorously resisted by the *fusca*, or that the *rufa* queen after once gaining adoption violently resents the intrusion of any other queens of her own species. July 19, during my walk up through the Turtmann valley, I saw numbers of dælata *rufa* queens running over the ground, so that the marriage flight of this species must have occurred either on that or the immediately preceding days. It is not improbable, therefore, that the *rufa* queens which I found in nests (1) and (2) had left their parental colonies only a few days before I found them associated with the *fusca* workers.

If my interpretation of the behavior of the *rufa* queen is correct, we must completely abandon Wasmann's hypothesis that dulosis is derived from temporary parasitism, since *rufa* no longer appears as a primitive and generalized type which could have given rise to both the passive temporary parasitism seen in *F. consocians*, *truncicola*, etc., and the aggressive, predatory parasitism of *sanguinea*, but belongs unequivocally to the *consocians* type. I am inclined to believe that Wasmann has been unconsciously led to his view through giving undue weight to the purely taxonomic status of *F. rufa* in our classification of the various species of *Formica*. As an old Linnean species it has come to be regarded as the type of a group of forms (*truncicola*, *pratensis* and a long series of American subspecies and varieties), but this is, of course, a purely artificial assumption, and we are not to conceive the European *rufa* as the most primitive ant of its group. Indeed this ant is more probably to be regarded as one of the most highly specialized and recent forms in the genus. I have elsewhere* given my reasons for dissenting from Wasmann's opinion that the predatory instincts of *sanguinea* have arisen from the passive form of adoption seen in *consocians* and *truncicola*. Very recently Emery† has advanced arguments very similar to my own. Emery

* The Ants of Casco Bay, Maine, with Observations on two Races of *Formica sanguinea* Latreille, *Bull. Amer. Mus. Nat. Hist.*, XXXIV, 1908, p. 633 et seq.

† Intorno all' origine delle Formiche dulotiche, parassitiche a mirmecofile, *Rendic. Sess. R. Accad. Sci. Ist. Bologna*, 17 Gen., 1909, pp. 36-51; translation: Ueber den Ursprung der dulotischen, parasitischen und myrmekophilen Ameisen, *Biol. Centralbl.*, XXIX, 1909, pp. 352-362.

seems, however, in his discussion of *F. rufa* to have been influenced by the results of Wasmann's experiments on females of this ant placed in artificial *fusca* nests, for he does not see the basis of the whole matter of temporary, permanent and dulotic parasitism in the general tendency of ant-queens to court adoption by workers of their own species of the same or other colonies—a tendency which Wasmann and I have attributed to the very general or widespread formicine habit of retaining a number of queens in the same colony—but regards the founding of *rufa* colonies with *fusca* workers as the primitive method, the founding of new nests by fission of the maternal colony and adoption of queens of the same species as a secondary development. Possibly the *rufa* queen, like the queen of *sanguinea* and of other species of *Formica* may be, as I have suggested,* an opportunist to the extent of regulating her behavior according to the behavior of the particular *fusca* colony which she enters. If the *fusca* are aggressive she may act more like *sanguinea*, whereas if they are timid or indifferent she probably permits herself to be passively adopted.†

II. *Strongylognathus huberi* Forel.

This interesting parasite on the common European *Tetramorium cespitum*, was originally described by Forel from workers (Fig. 1, *A*) taken from a colony which he found on a warm, rocky slope near Fully in the valley of the Rhone.‡ In 1900 he found the males and females (Fig. 1, *B*) in another nest in the same locality§ and gave an interesting account of the behavior of the workers. August 8, 1902, Prof. Carl Escherich also succeeded in finding a large colony containing many males and females in the same locality. Although I visited the place June 16, 1907, and again July 23, 1909, in company with Prof. Forel and Messrs. H. Viehmeyer and F. Schimmer, and sought very diligently for other colonies, I was unsuccessful. I was therefore

* The Ants of Casco Bay, etc., *loco citato*.

† A recent reply by Wasmann (Ueber den Ursprung des sozialen Parasitismus, der Sklaverei und der Myrmekophilie bei den Ameisen. *Biol. Centralbl.*, XXIX, Oct. and Nov., 1909) to Emery's criticisms, was received too late for consideration in connection with this note on *F. rufa*.

‡ Les Fourmis de la Suisse, 1874, p. 71.

§ *Strongylognathus huberi* et voisins, *Bull. Soc. Ent. Suisse*, X, 7, pp. 273-380.

greatly pleased some weeks later to find the species at Zermatt in seven *Tetramorium* colonies. The appearance of the specimens in this locality, however, struck me as being peculiar, because they seemed to differ from a series of topotypes of all three phases of *huberi* which had been generously given me by Professors Forel and Escherich. The workers of the Zermatt specimens were much darker in color except for the pro- and mesonotum which were very pale and shining and enabled me to distinguish them at a glance as they moved about among the *Tetramorium* workers. The males and females were in the larval and pupal condition in nearly all the nests

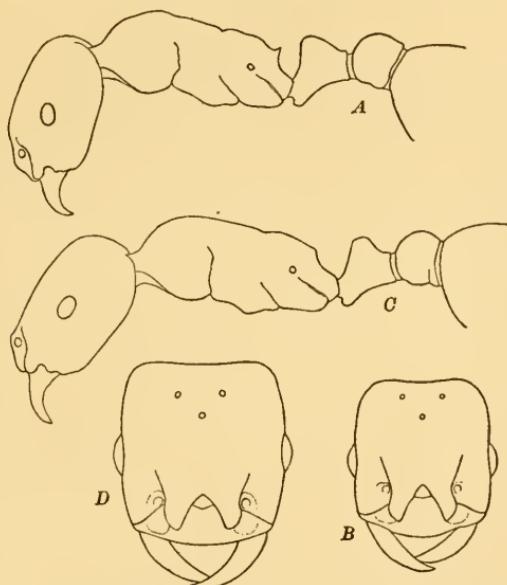


FIG. 1. *A*, *Strongylognathus huberi* Forel, worker; *B*, head of female; *C*, *S. huberi alpinus* subsp. nov., worker; *D*, head of female. All the figures drawn under the same magnification.

whereas the males and females of the uninfested *Tetramorium* colonies were either fully matured or had already celebrated their nuptial flight.

Careful comparison of the Zermatt specimens with the topotypes shows that they differ sufficiently from the typical form to be regarded as a new subspecies of the same rank as the other subspecies of *huberi*, namely, *christophi* Emery of Sarepta on the Volga, *cæciliae*

Forel of Spain, *afer* Emery of Spain and Algeria and *rehbinderi* Forel of the Caucasus. The new subspecies may be regarded as an alpine form of *huberi*, since it occurs at a considerably greater elevation (over 1,500 m.) than the type. I subjoin a brief description with some notes on the colonies which I found:

Strongylognathus huberi alpinus, new subspecies.

Worker.—Length 2.5–3.5 mm. (Fig. 1, C).

Differing from the worker of *huberi* as follows: Head somewhat broader and more robust. Epinotum unarmed, the small, pointed teeth of *huberi* being replaced by rather blunt angles. Summit of petiolar node in profile distinctly rounder and blunter and less compressed anteroposteriorly. Postpetiole twice as broad as long (decidedly longer in proportion to its width in *huberi*). Whole upper surface of pro- and mesonotum smooth and shining (shining area in *huberi* more restricted). Coloration in general much darker; head with a larger oblong, black or dark brown spot, as broad as the distance between the frontal carinae, reaching from the clypeus nearly to the occipital border and rather sharply marked off on the sides from the paler, brownish yellow color of the cheeks. In the typical *huberi* the front and vertex are only slightly darker than the remainder of the head or, at any rate the dark area is not distinctly marked off on the sides and behind.

Epinotum of *alpinus* darker than the pro- and mesonotum, the petiole and postpetiole still darker. Infuscation of the gaster also decidedly deeper than in *huberi*, all the segments being dark brown or blackish, with yellowish bases. Legs brownish yellow, with dark brown articulations.

Female.—Length 4–4.6 mm. (Fig. 1, D).

Differing from the female of *huberi* in the following particulars: Head decidedly larger and broader, rectangular, not narrowed behind, less than one and a fourth times as long as broad. Epinotum with blunt angular projections in the place of the stout teeth of *huberi*. Upper border of petiole sharp but not compressed at the very summit. Postpetiole trapezoidal, distinctly broader in front than behind, with broadly rounded anterior corners and straight sides. Sculpture, pilosity and color as in the typical *huberi*.

Male.—Length 4.5–5 mm.

Differs from the male of *huberi* only in having decidedly blunter epinotal angles.

Described from numerous workers and females and two males taken from the nests described in the following notes:

1. August 13. The first colony of *alpinus* was found less than a kilometer below Zermatt at an altitude of about 1,620 m., on the warm western slope of the Matter valley, where there was no end of *Tetramorium* colonies under flat stones. The nest containing the *alpinus* was of small size and under a single stone. The *alpinus*

workers were fairly numerous—1:4 or 5 *Tetramorium*—and there were many male and female larvæ and pupæ. I was unable to find a fertile queen of either species.

2. August 13. In the same locality I found a second colony of large size and extending under several contiguous stones. There was about 1 *alpinus* to every 3–5 *Tetramorium*, with many male and female larvæ and pupæ of the former. No fertile queens could be detected.

3. August 14. In the same locality a small *Tetramorium* colony was found containing a number of *alpinus* pupæ of all three phases, but no imaginal workers. The absence of these made it seem probable that the pupæ had been recently robbed by the *Tetramorium* workers from some feeble mixed colony in the neighborhood. I failed to find a mother queen of either species.

4. August 18. On the right bank of the Triftbach, about fifteen minutes' walk from Zermatt and also on the warm western slope of the valley, I found under a small stone about sixty *alpinus* workers with two *Tetramorium* workers and no larvæ or pupæ of either species. The whole assemblage had the appearance of being a small foraging party which had taken temporary refuge under the stone. In the immediate neighborhood, however, I failed to find any larger colony of which it could have been a part.

5. August 18. In the same locality I found a small colony containing about as many *alpinus* as *Tetramorium* workers, with a small number of sexual larvæ and pupæ of the former. This colony was under an isolated stone about 30 cm. in diameter. No queens of either species were seen.

6. August 18. In the same place I came upon an enormous *Tetramorium* colony—the largest I have ever seen—under two huge, contiguous, flat stones, each about 1.6 m. in diameter, and several smaller stones near by. The workers of the two species were about equally abundant, and besides many pupæ of all phases of *alpinus*, there were many recently hatched females and a very few males of this species. I was unable to explore the nest as the large stones could not be moved. I collected in a bag a colony of *Tetramorium* with their brood from a point several hundred meters further up the slope and dumped it on the flat stone near one of the main entrances of the *alpinus* nest. These ants were slow in learning of the proximity of the aliens, but after waiting about fifteen minutes I saw the *alpinus* issue from their nest, move out over the earth I had dumped on the

stone and fiercely attack the strange *Tetramorium*. The workers of the parasitic species seized the *Tetramorium* by the head or thorax, curled their bodies around the latter and tried to pierce their armor with the sharp, sickle-shaped mandibles. Other *alpinus* workers made for the strange larvæ and pupæ and began to carry them into the nest. This they did rather clumsily, but they showed themselves to be very familiar with the position of the nest-entrances. The strange *Tetramorium* that were not engaged in mortal combat with the *alpinus* hurried away over the stone in the opposite direction with such larvæ and pupæ as they could rescue. The hosts of the *alpinus* were not seen to throw out the strange pupæ and larvæ brought into the nest by their parasites, as happened in the similar experiment performed by Forel on a colony of the typical *huberi*.

7. August 18. In the same locality I found under a small flat stone a colony very similar to (4). It comprised about 100 *alpinus* workers, a very few *Tetramorium* and two or three larvæ, presumably of the latter species. These ants, too, appeared to be merely a foraging troop hiding under a stone.

Several of these observations tend to confirm Forel's belief that *S. huberi* is still, unlike the more degenerate *S. testaceus*, able to make dulotic raids on strange *Tetramorium* colonies. This is indicated by the behavior of the huge colony (6) and by its size, which so far exceeded that of any of the *Tetramorium* colonies I have seen, that I can only suppose that it had grown by repeated slave-making forays. The two isolated bands of *alpinus* workers (4) and (7) also point in the same direction, and suggest that the forays of this ant may be nocturnal and that the dulotic troops may hide under stones during the hot hours of the day. This may, perhaps, account for the fact that the forays of this rare and diminutive ant have hitherto failed to attract attention.

III. *Anergates atratulus* Schenck.

On finding such numbers of *Tetramorium* colonies on the western slopes of the Matter valley, and especially after coming upon the colonies containing the *Strongylognathus* described in the preceding paragraphs, I naturally began to look for the extraordinary *Anergates*, which is also a parasite on *Tetramorium*. After much search I succeeded in finding it in the locality south of Zermatt where I first observed *S. alpinus*, in two nests which may be briefly described:

1. August 13. A large *Tetramorium* colony under half a dozen rather large, flat, contiguous stones arrested my attention, because it contained several hundred larvæ, all of the same size and of a peculiar gray color, unlike the gleaming white larvæ so abundant in the other colonies of this ant. On scrutinizing the superficial chambers of the nest more closely, I saw four fine, de älated *Anergates* queens in the peculiar, obese or physogastric condition, which this alone of all European ants is able to attain. Three of these queens were close together under the center of one of the stones, the other was in a similar position under an adjacent stone. It was quite clear then that the gray larvæ were the offspring of these queens, and from their size it was evident that they were mature and nearly or quite ready to pupate. Of course, there were besides only *Tetramorium* workers in the colony and none of their larvæ. I do not know whether other observers have noticed the singular uniformity in the age and development of the larvæ of *Anergates*. It is very striking, though it is what we should expect, for the life of the *Anergates* colony must be of short duration, since it cannot exceed that of its sterile host, the *Tetramorium* workers. It is, indeed, quite possible that the whole development of the *Anergates* colony does not require more than a year, or, at any rate, that the queens of this species become physogastric, owing to the rapid and enormous development of their ovaries, and begin to lay within a few months after entering the *Tetramorium* colony, and that the brood matures by the following summer. Owing to the altitude at which this colony was found (about 1,600 m.), the maturity of the brood must have been greatly delayed and probably would not have hatched till the latter part of August or early in September. In my former paper* I described a fine *Anergates* colony which I found near Vaud, June 6, 1907, at a much lower elevation. This already contained the imaginal brood of the summer.

2. August 14. In the same locality but lower down the slope and less than a hundred meters from the Matter, I detected a second colony, which, however, was small and depauperate and was living under a single small stone. This colony, too, contained a number of the gray larvæ, which, as in the preceding case, were all of the same size and partly adhering by means of their hooked, dorsal hairs to the lower surface of the stone. The nest also contained a number of

* Comparative Ethology, etc., *loco citato*, p. 430.

large root-aphids of both sexes and in all their developmental stages. After careful search I found the obese *Anergates* queen, but she was dead and somewhat shriveled, and her thorax had been separated from her gaster. She had probably been killed by the *Tetramorium* workers, which were dividing their attention between bringing up her larvae and attending the aphids.

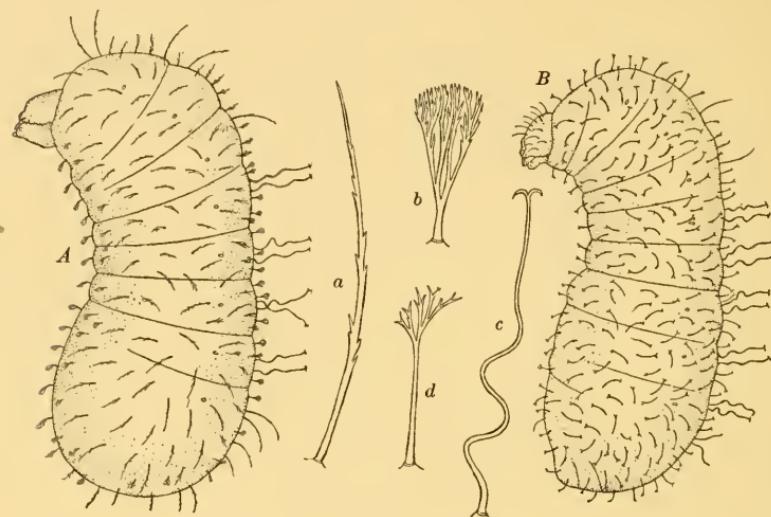


FIG. 2. *A*, adult larva of *Anergates atratulus*; *a* and *b*, long, serrate and short, branching hair of same, more highly magnified; *B*, adult worker larva of *Tetramorium cespitum*; *c* and *d*, long, anchor-tipped, dorsal hair and short, branching hair of same, more highly magnified.

As collectors are always interested in the various parasitic ants that live with *Tetramorium*, I may here introduce a few suggestions that may aid them in detecting infested colonies. In the first place, it is advisable to concentrate one's attention on a locality in which *Tetramorium* colonies are unusually abundant. In the second place, the collector should examine the nests at the height of the breeding season, that is, during June and July at the lower, and early in August at the higher altitudes, when the normal colonies contain larvae and pupae of all three phases. He may safely pass over at once all colonies containing the larger male and female larvae and pupae of the *Tetramorium*, as such colonies do not contain *Anergates* or any of the species or subspecies of *Strongylognathus* (*testaceus*, *huberi*,

alpinus), and concentrate his attention on the colonies which at first glance appear to contain only workers and worker brood of the *Tetramorium*. If present, *S. huberi* and *alpinus* may be at once recognized by the number, size and color of their workers. *S. testaceus*, the commonest species of the genus, must be sought more carefully, because its workers are small and much less abundant, though they, too, are lighter in color than the *Tetramorium* workers. Later in the summer, (during July and August), of course, *Tetramorium* colonies infested with the various *Strongylognathus* are easily recognized by the great numbers of small males and females of these parasites. Finally, the presence of uniformly developed, gray larvæ may be taken to indicate the occurrence of *Anergates*, the rarest of these parasites, if its presence is not already conspicuously indicated by the numerous imaginal brood of small black females and sordid yellow, nymphoid males.

With a good pocket lens the *Anergates* larva may also be recognized by its peculiar hairs. It has been briefly described, and a few of its hairs have been figured by Adlerz.* I give a figure (Fig. 2, A) of a larva from one of the nests described above, and also of a mature worker larva of *Tetramorium* (Fig. 2, B) for comparison. It will be seen that though both larvæ possess pairs of long anchor-tipped dorsal hairs, the head of the *Anergates* larva is naked, and its short dorsal and ventral hairs (b) are much more densely and compactly branching, while the longer hairs (a) are serrate and not branched at their tips like the homologous structures (d) of the *Tetramorium* larva. The anchor-tipped hairs (c) with sigmoid basal flexure are used in both species for fastening the larvæ to the lower surfaces of stones, the roots of plants and the walls of the galleries and chambers of the nest.

IV. *Monomorium minutum* Mayr.

August 27, between nine and ten A. M., while I was collecting in a field near the Jewish cemetery on the island of Lido, near Venice, I happened on a number of colonies of *Monomorium minutum* which were nesting in small and indistinct masonry mounds in the grass. These nests were not unlike those of the form which in the eastern

* Myrmecologiska Studier—II. Svenska Myror och deras Lefnadsför-hållanden, Bih. Svensk. Vet.-Akad. Handl., XI, 1886, p. 274, pl. VII, figs. 5 and 5a.

and southern United States has been passing under the name of *M. minutum* var. *minimum* Buckley. What attracted my attention to these nests was the great number of extremely small, jet-black workers running up and down the grass-blades around the entrances. On closer examination I found that the ants were celebrating what corresponds to the nuptial flight in other species. Among the workers were numbers of females, running up and down the grass-blades and still issuing from the galleries, but all of these females were wingless. They moved about in great excitement behaving exactly like the winged females of other ants on such occasions, but being unable to fly, they finally crawled down to the ground and wandered away from the nests, often accompanied for a short distance by the excited workers. There were no males to be seen either outside or inside the nests. Throughout the morning I kept finding the wingless females in all parts of the field, running about singly and evidently seeking for places in which to found their formicaries.

Examination of all the females I could capture—several dozens in number—showed that they were truly apterous. Their thoraces were narrow and, though queen-like in the structure of their sclerites, showed not the slightest evidence of ever having borne wings. These females were, in fact, precisely like the females of the tropical *M. floricola* Jerdon and *M. carbonarium* F. Smith subsp. *ebeninum* Forel described in my paper on the ants of the Bahamas.* This peculiar condition and the complete absence of males at the time of the abortive but unmistakable marriage-flight (*sit venia verbo*) described above, suggested the following questions: Were the ergatoid and apterous females so abundantly produced in each colony fecundated in the parental nest some weeks previously by their own brothers? Or can it be that males are very rarely or never produced by this species, and that the females lay unfertilized eggs capable of developing into workers or females? Or are there two generations of females, one winged and produced earlier in the summer at a time when males also appear, and a later ergatoid and parthenogenetic generation which perform a necessarily abortive marriage-flight in the latter part of August? It is easy to formulate these and other questions, but they are to be answered only by some resident entomologist who can devote special study to this little insect.

* The Ants of the Bahamas, *Bull. Amer. Mus. Nat. Hist.*, XXI, 1905, pp. 87–89, Figs. D and E.

The perplexity into which one is thrown by the observations above recorded is not lessened by an examination of the literature. *M. minutum* was first described by Mayr more than half a century ago,* and it seems to have been little studied since that time. Mayr saw only worker specimens, which he records as coming from Lombardy and from Lido, the very locality in which I happened to find the species. These specimens were taken by Prof. Strobel in sweeping, possibly in the very field in which I made my observations. Even in his later account† Mayr cites only the worker. In 1891 Forel gave a full description of all three phases, which he cited from various parts of Africa.‡ He gave the length of the female as 4-4.5 mm. and says that its "wings are unknown." Apparently he believed that his female specimens were dealated. The most recent monographer of the European ants, Emery,§ gives the length of the *M. minutum* female as 3.4-3.7 mm., and states that it is "winged." There is, therefore, a discrepancy between Emery's account and my own, and we must suppose, either that *M. minutum* has two forms of females, or that Emery's statement refers to some other form, for I can hardly doubt that the species I observed is really the one described by Mayr, since the workers not only agree perfectly with his account, but came from the type locality. My specimens are, in fact, topotypes, owing to the very small size of Lido and the restricted area on the island which can be inhabited by these ants.

Not only will it be necessary, therefore, to re-examine the material of *M. minutum* in our collections, but this should also be done with all the other small black species of *Monomorium* (*ebeninum*, *carbonarium* and *minimum*). I am satisfied that the American form called *M. minutum* var. *minimum* Buckley by Emery|| should be regarded as specifically distinct, as all three of its phases are not only larger (worker nearly 2 mm., female 4.5-5 mm., male 3.5-4.5 mm.) than those of *minutum* (worker 1.4-1.6 mm., female 3.4-3.7 mm., male

* *Formicina Austriaca*, 1855, p. 453.

† *Die europäischen Formiciden*, 1861, p. 72.

‡ *Formicidæ*, in *Hist. Phys. Nat. Polit. Madagascar*, par A. Grandidier, 1891, p. 165.

§ *Beiträge zur Monographie der Formiciden des paläarktischen Faunengebietes*, V. *Deutsch. Ent. Zeitschr.*, 1908, pp. 666 and 680.

|| *Beiträge zur Kenntniss der nordamerikanischen Ameisenfauna*, *Zool. Jahrb. Abth. f. Syst.*, VIII, 1894, p. 274.

4 mm.), but the females are always winged. The form I described from Catalina Island* as *M. minutum* subsp. *ergatogyna*, which has ergatoid females like those of *ebeninum* and *minutum*, may prove to be the typical *minutum* accidentally introduced into Catalina. Its workers are, however, decidedly larger than the Venetian specimens, though they have the same depressed and sloping epinotum.

POSTSCRIPT.

Since the foregoing paragraphs were sent to the printer, Professor Emery has published a revision of the genus *Strongylognathus* (Beiträge zur Monographie der Formiciden des paläarktischen Faunengebietes (Hym.), IX. *Deutsch. Ent. Zeitschr.*, 1909, pp. 695-712, 7 figs.). He not only describes several new subspecies and varieties, but changes the status of some of those previously known. The following is a list of the forms as they now stand, including the new subspecies described above:

Strongylognathus testaceus Schenck (Central and Southern Europe).

S. huberi Forel, including:

Subsp. *huberi huberi* Forel (Canton Vallais, Switzerland);

var. *gallica* Emery (Pyrenees);

var. *forcli* Emery (Eastern Algeria);

var. *christophi* Emery (Eastern and Southeastern Russia);

Subsp. *alpinus* Wheeler (Zermatt, Switzerland);

Subsp. *rchbinderi* Forel (Caucasus);

var. *cecconii* Emery (Tremiti Islands in the Adriatic);

Subsp. *ruzskyi* Emery (Ural Mts.).

S. afer Emery, including:

Subsp. *afer afer* Emery (Western Algeria);

Subsp. *cæciliae* Forel (Spain).

S. alpinus resembles *S. huberi* var. *gallica*, to judge from Emery's brief description of the worker: "Kopfseite noch mehr gebogen als im Typus; Postpetiolus im Verhältnis zum Petiolusknoten viel kürzer; Thoraxrücken kaum eingedrückt; Epinotum mit schwacher Spur von Zähnen." I had originally dedicated the subspecies *alpinus*

* Ants from Catalina Island, California, *Bull. Amer. Mus. Nat. Hist.*, XX, 1904, p. 269.

to Professor Forel, but Emery's recent description of a variety of *huberi* as *foreli* has compelled me to change the name. It is an interesting fact that nearly every form of *S. huberi* has been recorded from a different locality. This seems to indicate that the species is extremely sensitive to differences in external conditions.

A CRICKET NEW TO NEW JERSEY.

BY WM. T. DAVIS,

NEW BRIGHTON, STATEN ISLAND, N. Y.

While sitting on the ground in the pine woods at Lakehurst, N. J., on the third of October, I noticed a small female cricket, which was promptly captured. Shortly after Mr. Chas. E. Sleight called my attention to another on my shoe. This last was a male. I had been hearing an unfamiliar low sounding *chink, chink, chink*, which I presume was made by the species of cricket under consideration. Upon further search we each captured two more specimens, making in all three males and three females. After this we were unable to find any others.

In the Proceedings of the Boston Society of Natural History for October, 1868, Dr. Scudder describes as new the genus *Cycloptilum* founded on a single male cricket from Texas, which he called *squamosum*. The description of the genus *Cycloptilum* and the species *squamosum* as there given answers very well for the Lakehurst specimens, but later Dr. Scudder in his "Guide to the Genera and Classification of the North American Orthoptera Found North of Mexico," 1897, following the tables given by Saussure in 1877, gives an additional character to the genus which would not readily permit of the placing therein of the Lakehurst specimens.

Dr. Scudder says of *Cycloptilum* in 1897, "First joint of hind tarsi neither sulcate nor serrate; pronotum produced posteriorly, concealing the metanotum." The males of the species from Lakehurst have the pronotum as here described, but the first joints of the hind tarsi in both sexes have each two rows of serrations on their upper sides.

Saussure in 1874 in his figure of the posterior leg of *Cycloptilum americanum* (= *C. pocyi* of the plates), shows that there are no

serrations on the upper side of the first joints of the posterior tarsi; there are only hairs shown and described. This figure clearly defines what he considered one of the chief characters of the genus, which character is adopted by Dr. Scudder as above cited.

Through the courtesy of Mr. Samuel Henshaw I have examined the type of *Cycloptilum squamosum* in the Museum of Comparative Zoölogy, Cambridge, Mass., and find that the hind tarsus is serrated as in the New Jersey specimens. As they also agree with the type in other particulars, we may conclude that *Cycloptilum squamosum* occurs in the pine barrens of New Jersey.

There are authentic specimens of *Nemobius palustris* Blatchley in the Scudder collection, and by comparison with them we find we have that species from the lowland of Lakehurst and also from Lake Hopatcong, N. J. This insect has also been reported from Connecticut and Massachusetts by Prof. Morse.

Lastly, I wish to thank Dr. Frank E. Lutz, of the American Museum of Natural History, for much aid in the literature from the library of that institution.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF TUESDAY, MAY 18, 1909.

Held at the American Museum of Natural History, President C. W. Leng in the chair, with eighteen members and two visitors present.

The librarian, Mr. Schaeffer, announced the receipt of the following exchanges:

Science Bulletin, I, No. 15, Mus. Brooklyn Inst.

Canadian Entomol., XLI, No. 5.

Berlin Entomol. Zeitschrift, Vol. 53, Nos. 3 and 4.

Mr. Davis, of the Field Committee, reported on the arrangements for the outing at Lakehurst, N. J., on the Fourth of July. Tents and cooking utensils had been secured through the kindness of Mr. Sleight, and arrangements had been made with a neighboring family to do most of the cooking. Although the outing was planned for three days, those who wished might make arrangements to stay longer.

Mr. Dow, of the Field Committee, announced the partial arrangement for a Decoration Day trip to Greenwood Lake. Notice would be sent to members by postal card.

On motion of the secretary the meetings of June were dispensed with.

Mr. Schaeffer exhibited some new and interesting species of Buprestidæ mostly from Brownsville, Texas, and from Arizona, and spoke concerning some of the important characters and habits of the forms.

Mr. Davis exhibited a turtle showing several large swellings on the neck in which were the developing larvæ of bot-flies.

Mr. Barber stated that he had bred some of these flies from a turtle similarly affected at Cold Spring Harbor, L. I., in 1902.

Mr. John Angell exhibited a specimen of *Calosoma calidum* which had a bright green bordering stripe on the margin of the elytra.

Prof. J. B. Smith spoke of the early appearance of the elm-leaf beetles in such numbers, in certain places, as to indicate a repetition of their destructiveness of last season. These early beetles were just out of hibernation, and on a small elm near the New Jersey Experiment Station he had estimated there were eight thousand specimens.

Mr. Engelhardt spoke of collecting a quantity of *Callidium janthinum* in the window of a store on Fulton Street where rustic wood furniture was for sale.

Mr. Roberts exhibited his collection of Dytiscidæ, explained the structural characters used in differentiating the species, and mentioned the synonymy of certain forms.

Mr. Comstock spoke on the systematic work he had been carrying on at

Jamesburg in breeding Lycenidae and in making observations and notes concerning the different stages of the local species.

Mr. Pollard gave an account of his recent trip to Washington, where he spent some hours collecting on Plummer's Island in company with a number of Washington entomologists. He mentioned the butterflies found on the island.

Dr. Zabriskie remarked that at Moriches, L. I., the flooring and wood work in a house belonging to Mr. Robert Lefferts had been badly damaged by beetles which he thought were *Hylotrupes bajulus*. Some of these were exhibited.

Mr. Dow stated that while collecting along Rockaway Beach the previous Sunday he had picked up one hundred and ten different kinds of beetles.

Mr. Lutz exhibited a beautiful Hydrachnid which he intended to send to Prof. Wolcott, of the University of Nebraska, for identification.

Mr. Schaeffer auctioneered the specimens of Lepidoptera donated by Mrs. A. T. Slosson several years ago.

Mr. Davis read a letter from Mrs. Slosson, and on motion Mr. Davis was requested to convey to her the good wishes of the society.

Mr. Dow, on motion, was also requested to give Mr. Joutel the best wishes of the society with sincere regrets that he could not be present.

MEETING OF TUESDAY, OCTOBER 5, 1909.

Held at the American Museum of Natural History, President C. W. Leng in the chair, with twenty-three members and four visitors present.

The minutes of the preceding meeting were read and approved.

The treasurer, Mr. Davis, reported the society's balance as \$1,122.60 and that of the Journal as \$122.08.

The librarian reported the receipt of the following exchanges since the May 18 meeting:

Deutsche Entomologische Zeitschrift.

Revue d'Entomologie, Vol. VII, No. 4; Vol. VIII, Nos. 1, 2.

Horæ Societatis Entomologicae Rossicæ, Vol. XXXVIII, No. 4.

Bull. de la Société Imperiale de Moscow, 1907, No. 4.

Boletin de Museu Goeldi, Vol. V, No. 2.

Wiener Entomol. Zeitung, Vol. XVII, Nos. 3, 4, 5, 6.

Zeitschrift f. Wissenschaftliche Insektenbiologie, Vol. V, Nos. 4, 8.

Canad. Entomologist, Vol. XLI, Nos. 6, 7, 8, 9.

Tidjschrift voor Entomologie, 1909, Nos. 1, 2.

Mittheilungen d. schweizerischen Entom. Gesellschaft, Vol. X, No. 9.

Montana Agricultural College Exp. Stat., Bull. No. 75.

Montana Agricultural College Exp. Stat., 15th Ann. Report, 1908.

Ants of Formosa and the Philippines, by W. M. Wheeler.

The Thorax of Insects and the Articulation of the Wings, by R. E. Snodgrass.

Dragon-flies of the Mississippi Valley, by Chas. B. Wilson.

Descriptions of Some Bees in the U. S. Nat. Mus., by T. D. A. Cockerell.

- Verhandlungen d. K. K. Zool. Bot. Gesellschaft in Wien, LIX, Nos. 3, 4, 5.
Medellander af Soc. pro Fauna et Flora Fennica, 1907, 1908.
Acta Societatis pro Fauna et Flora Fennica, Nos. 29, 31.
Festschrift für Prof. Palmén, Vols. 1 and 2.
Science Bull. Museum Brooklyn Institute, Vol. I, No. 16.
Anales del Museo Nacional de Montevideo, Vol. VII.
Flora Uruguaya, Vol. IV, No. 1.
Bull. de la Soc. Entomologique d'Égypte, 1908, Nos. 2, 3, 4.
Mémoirs de la Soc. Entomol. d'Égypte, Vol. I, No. 1.
Bull. University of Texas, No. 120.
Entomologiske Middeleser, 1909, Vol. IV, No. 1.
The Genus *Dendroctonus*, by A. D. Hopkins.
Societas Entomologica, XXIV, Nos. 7, 8, 9, 10, 11, 12.
Entomologische Berichte, Vol. II, Nos. 43-48.
Anales de Museo Nacional de Buenos Aires, ser. III, Vol. X.
Le Litige des scories et des terres cuites anthropiques par Florentino Ameghino.
Monographic Revision of the Eleodini, by F. E. Blaisdell.
Berliner Entomol. Zeitschrift, Vol. LIV, Nos. 1, 2.
Trans. Wisconsin Acad. Sci., Vol. XVI, Pt. I, Nos. 1-6.
Mittheilungen Zool. Mus. Berlin, Vol. IV, No. 2.
Bericht Zool. Mus. Berlin for 1908.

Dr. Zabriskie read the following report: "The Executive Committee report that the American Museum of Natural History has made provision for meetings of the New York Entomological Society to be held in the hall in which the local collection of insects is stored, and has placed that collection in the custody of the society. Members of the society may have access to this collection, for the purpose of study, at any time when the museum is open. The committee hopes that each member of the society will do his part in assisting Dr. Lutz in making the local collection complete.

"The Executive Committee further recommends that the high appreciation of the society and its thanks be conveyed by letter to Professor H. C. Bumpus, director of the American Museum of Natural History."

Dr. Lutz related what had been done by himself during the summer towards getting the local collection in order. This consisted largely in printing and arranging labels for all of the orders, with the exception of the Diptera and Hymenoptera. The others would be arranged as soon as possible. Labels were made for all species likely to occur. Members were invited to coöperate and fill up gaps in the collection. On a large map drawn on the blackboard Dr. Lutz pointed out the geographical limits of the local collection. He further explained that members were invited to make free use of the room set apart for their use. It was very likely that members could use the room even at times when the museum was not open to the general public.

On the motion of Mr. Angell the society voted to accept the kind offer of the custody of the local collection of insects and instructed the secretary to thank Dr. Bumpus for the interest shown in the society.

Mr. Davis, of the Field Committee, reported concerning the very successful Fourth of July meeting at Lakehurst, which was attended by eighteen members.

Mr. Schaeffer explained the delay of the September issue of the Journal.

Mr. Comstock proposed as an active member Mary R. Robinson, 75½ Broad Street, Newark, N. J. Mr. Lutz proposed Mr. Thos. Hallinan, Paterson, N. J., and Mr. Chester O. Hyde, 127 E. 93d St., New York City.

On a motion of Mr. Harris the by-laws were suspended and the secretary cast a single ballot for the election to active membership of the three proposed members.

Dr. Zabriskie presented the following: "Written notice, in accordance with Article XIX. of the by-laws, is hereby given of a motion to be presented at the next regular meeting, to amend the laws by adding to Article IV, after the word Librarian, the following words, 'a curator,' and by adding after Article IX the following: Article IX^a Curator—"It shall be the duty of the curator to receive and take charge of all entomological specimens in the custody of the society and to perform such other duties as may be determined by the society."

The president called upon different members to give an account of their summer's collecting experiences.

Mr. Davis stated that he had visited so many places and found so many interesting things that it was difficult for him to select just what to say first, but he exhibited a live specimen of an interesting beetle, *Xyloryctes satyrus*, which he had bred from a grub taken in northern Georgia. He pointed out that the striation of the elytra seemed to be peculiar. He also exhibited some galls of *Andricus lubricola* taken at Lakehurst, N. J., October 3, occurring on post-oak. They are considered to be rare.

Mr. Comstock gave an account of a visit which he made to the Boston Society of Natural History and the Cambridge Museum of Comparative Zoölogy during the past summer. He remarked that the Harris Collection was in good condition in spite of the fact that it had been stored part of the time. He referred to a number of synonyms which he noticed in the type material of Lycaenidae in both museums.

Mr. Pollard exhibited a dwarf specimen of a Mexican moth, *Rothschildia jorulla*, which he had bred from the egg. The dwarfing, Mr. Pollard thought, might be due to a difference in food or in climatic condition.

Mr. Joutel stated that, in his experience in breeding these Bombycine moths, there was no dwarfing due to change of food or climate.

Mr. Schaeffer exhibited some interesting Coleoptera among which were *Alaus patricius* a West Indian species, *Calosoma splendidum*, which Mr. Angell had obtained from Mr. Brownell, collected in Key West, Florida, and *Cicindela 6-guttata* form *harrisii*, a variety with thorax and base of elytra coppery.

Mr. Leng stated that in looking over some material in the collection of Mr. Bischoff he had found the following species of Coleoptera new to the New Jersey list of insects:

Schanicus puberulus Lec., *Acalles carinatus* Lec., *Himatium errans* Lec.,
Micropeplus cibratus Lec.

Prof. Smith had also found a new beetle, *Exochomus 4-punctulatus*, which was captured in a nursery on imported coniferous trees.

Mr. Olsen exhibited a box of Hemiptera taken during the summer on Long Island and called attention to several specimens of *Tetyra bipunctata* taken at Bay Shore, L. I. Though fairly common at Lakehurst on pines it has never before been reported from Long Island.

Mr. Davis reported that Mr. Silas C. Wheat had also taken this species during the summer on August 11 at Pine Lawn, Long Island. The young were on the green pine cones.

Mr. Dickerson exhibited a live praying mantis which he had obtained in a nursery near the New Jersey Experiment Station. Quite a few other specimens were seen. The species had probably been introduced upon nursery stock.

Mr. Dickerson spoke of the history of the introduction of this species from Asia and the efforts which had been made to acclimatize it in the United States. Mr. Philip Laurent had found a few at Germantown, Pa., in 1898. It has failed to get a permanent foothold. Mr. Lutz showed the egg cases of this species.

Mr. Sleight showed a specimen of *Catocala herodias* the larva of which was collected at Lakehurst on *Quercus nana* (scrub oak), May 24. The moth emerged from the cocoon on July 6.

Mr. Lutz exhibited a jar partly filled with earth in which could plainly be seen the furrows made by the cricket's ovipositor and the eggs at the bottom of each.

Society adjourned.

H. G. BARBER,
Secretary.

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Generic names begin with a capital, specific names with a small letter.
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